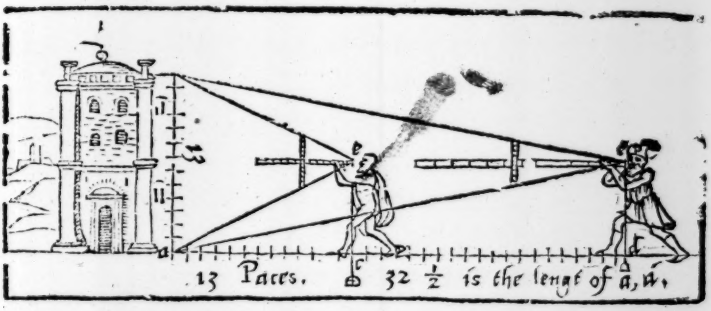
Tec.
A

# BOOKE NAMED TECTONICON,

Briefly ſhewing the exact meaſuring, and ſpeedie reckoning all manner of Land, Squares, Timber, Stone, Steeples, *Pillers, Globes, & c. Further, declaring the perfect making and large vſe* of the Carpenters Ruler, containing a Quadrant Geometricall: *comprehending alſo the rare vſe of the Squire. And in the end a little* Treatiſe adioyning, opening the compoſition and appliancy of an Inſtrument called the Profitable Staffe. With other things *pleaſant and neceſſary, moſt conducible for* Surueyers, Land-meaters, Ioyners, Carpenters and Maſons.

*Publiſhed by* LEONARD DIGGES *Gentleman, in the yeere of our Lord,* 1556.




LONDON,
Imprinted by *Felix Kyngſton.*
1634.

# L.D. To the Reader.

*Although (gentle Reader) many excellent in Geometry, vpon infallible grounds, haue put forth diuers most certaine and sufficient Rules, touching the measuring of all manner Superficies: yet in that the Art of numbring hath beene required, yea chiefly those Rules hid, and as it were locked vp in strange Tongues, they doe profit (or haue furthered) very little the most part: Certes nothing at all, the Land-meater, Carpenter, Mason, wanting the aforesaid. For their sakes I am here prouoked not to hide, but to open, and so encrease the Talent which I haue receiued: yea, to publish in this our Tongue very shortly (if God giue life) a volume containing the flowers of the Sciences Mathematicall largely applied to our outward practise, profitably pleasant to all manner men in this Realme. In the meane time I shall desire the Artificers aboue named, to bee contented with this little Booke (a taste of my good will towards them) which I wish euen so to further the Readers, as I know it sufficient for the true measuring and ready account of all manner Land, Timber, Stone, Boord, Glasse, Pauement, &c.*

*Here mine aduice shall bee to these Artificers that will profit in this, or any of my bookes now published, or that hereafter shall be, first confusedly to reade them thorow, then with more iudgement. Reade at the third reading, wittily to practise: So few things shall be vnknowne. Note, oft diligent reading, ioyned with ingenious practise, causeth profitable labour.*

*Thus most heartily farewell (louing Reader) to whom I wish my selfe present, to further my desire and practise in these.*

# THE PLEASANT PROFIT OR content of this little Booke, and in what it *exceedeth all other published.*

OThER Bookes tofore put forth in our Engliſh tongue, contained onely the bare meaſuring of Land, Timber, and Boord: how agreeable in all places to the rules of Geometrie, let the learned iudge. Here (gentle Reader) thou ſhalt plainely perceiue through diligent reading, how to meaſure truely, and very ſpeedily all manner of Land, Timber, Stone, Steeples, Pillers, Globes, Boord, Glaſſe, Pauement, &c. without any trouble: not painted with many rules, or obſcure termes, nor yet with the multitude of Tables, as heretofore hath bin: in which not a few errours were committed: for that cauſe no iuſt account might any way bee had. Further, ye ſhall by this Booke vnderſtand the whole making and comely handling of the Carpenters Ruler, with the true meaſure, &c. And his vſe appointed to the ready meaſuring of all kinde of Timber, Stone, Boord, &c. Alſo the leueling of grounds, and taking of heights, is pleaſantly and diuerſly practiſed by the Ruler. Yee haue here not the common, but the rare vſe of the Square, applied to heights, lengths, &c. And to the finding of the iuſt houre of the day diuers wayes, through the aide of pleaſant Tables newly adioyned to my generall Prognoſtication: by the which the proportion of things, direct or ſquire-wiſe ſtanding, are by their ſhadowes knowne.

To conclude, in the end of this Booke is added a Treatiſe, ſhewing the making, and vſe of an Inſtrument, by which yee ſhall get lengths, heights, breadths, wideneſſes, where or howſoeuer they ſtand. Other neceſſary things are contained in this little volume, which I commit to the diligent Reader.

# DIVERS THINGS
## CONDVCIBLE TO THE ART OF MEASVRING.

### *The first Chapter.*

AS there are few Craftsmen which haue all the kindes of Arithmetike readily: so I doe suppose none so ignorant, but that they doe or may easily perceiue the simple significations of these Characters or figures, 1.2.3.4.5.6.7.8.9.10. And also their strength in the first, second, and third rowmes placed. Characters numerall.

Besides that, they must bee familiar with these and such like fractions.

$\frac{1}{2}\ \frac{1}{3}\ \frac{1}{4}\ \frac{1}{5}\ \frac{1}{6}\ \frac{1}{7}\ \frac{1}{16}\ \frac{32}{}\ \frac{3}{4}\ \frac{4}{5}\ \frac{9}{10}$. The first leftward betokeneth one second part of an whole, bee it Pearch, Inch, or any other measure: the next, one third, then one seuenth part: the other ensuing one sixteenth. So one thirty and two parts of an Inch. Then follow three fourths: foure fifths. The last is nine tenths of an Inch: that is, nine parts of an Inch, diuided into tenne portions. Fractions.

These I doe intend to put in my Examples, and in my Tables and margines following, to represent parts of Pearches or Inches. As if I would write halfe an Inch, after this

this manner ½. Three quarters of an inch thus ¾. One eight of a Pearch, on this wise ⅛. So of the rest.

It is requisite also heere to open what a Pearch, a Day worke, a Roode, and an Acre is.

Although there are diuers opinions engendred through long custome in many places, of the length of a Pearch (vpon which our chiefe matter dependeth) yet there is but one true Pearch by Statute appointed to measure by. Wherein is ordained three Barly cornes dry and round, to make an Inch: twelue inches, a Foot: three Foote a Yard: fiue Yards, ½. a Pearch: foure Pearches in length, and foure in breadth, an Acre. So an Acre by statute ought to containe 160. Pearches; the halfe Acre 80. Pearches; a Roode, commonly called a quarter, 40. Pearches, a Day worke 4. Pearches. Loe heere the Acre expressed with his length and breadth.

Acre.

| Breadth. | | Length. |
|---|---|---|
| 1 | 160 | |
| 2 | 80 | |
| 4 | 40 | |
| 5 | 32 | |
| 8 | 20 | |
| 10 | 16 | |

Instruments to measure with Poales, Cord knotted, Profitable staffe.

I must not omit heere to tell you what thing is meetest to measure Land with. They vse commonly in the country two Poales, either of them the length of a Pearch. They are very good: yet for all kinde of Land, a Cord fiue Pearches in length, well seared with ware and rosin, knotted or marked at the end of euery Pearch, is more meete and readier. But in my fantasie, the instrument Geometricall, which is put forth in the end of this Booke, passeth them all and other, for the exact truth and quickest speed. This Instrument is so generall and auaileable to so sundry things, that it alone requireth a large Booke, if it should be sufficiently set forth.

Triangle.

Also I would not haue you ignorant what piece of Land is called a Triangle, which often shall hereafter bee named. It is such a fashioned piece as hath (or is imagined to haue) three sides, and three Angles onely: whether the sides bee equall or otherwise, as this figure sheweth. Againe, note that a line is said to fall Squirewise, when it cutteth any thing, or any of a Triangle full crosse, like vnto a Squire: As the hanging

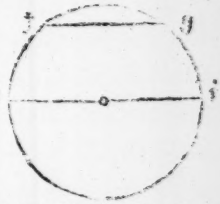
Line falling Squirewise.

pricked

pricked line a. b. in c. d. the base line of the Triangle. Loe it cutteth the side squirewise, or full crosse in the point b. and not as the other line a. c. doth. The base of any Triangle is here called that side, which is cut squirewise of the hanging line.

Base line.

Concerning a Circle, know, that the compasse of any Circle is named a Circumference: the middle point in him his Center: the right line h. i. that goeth ouerwhart that Center touching the Circumference on both sides is his Diameter: the halfe of that line, the Semidiameter. Also an Arch is a piece of the Circumference cut away: as yee see the Arch aboue the line f. g. Also f. g. h. i. in this Circle are named paralels: for that they differ equally in all places, the one from the other.



Circle.
Circumference.
Center.
Diameter.
Semidiameter.
Arch.
Paralels.

Note because practise and experience sheweth me, that there is almost no Land, but it may easily be brought by imagination to a Triangle or Triangles, and so most truly measured: therefore, to be short, this order shall bee taken: I will first figure and set afore your eyes Triangled Land, and other which by imaginations shall bee brought into Triangles. Then I shall teach the true measuring of them: I meane, how to finde a length and breadth, with which yee shall enter the table of account following, where the Acres and odde Pearches (if there bee any) shall appeare. As these figures are measured, so all Triangled Land, and other brought into Triangles, of what fashion so euer they be, shall be measured. And because it is requisite for true measuring of all Triangles, to finde a straight hanging line, I shall shew first how that line is to bee found, imagined, or drawne.

How

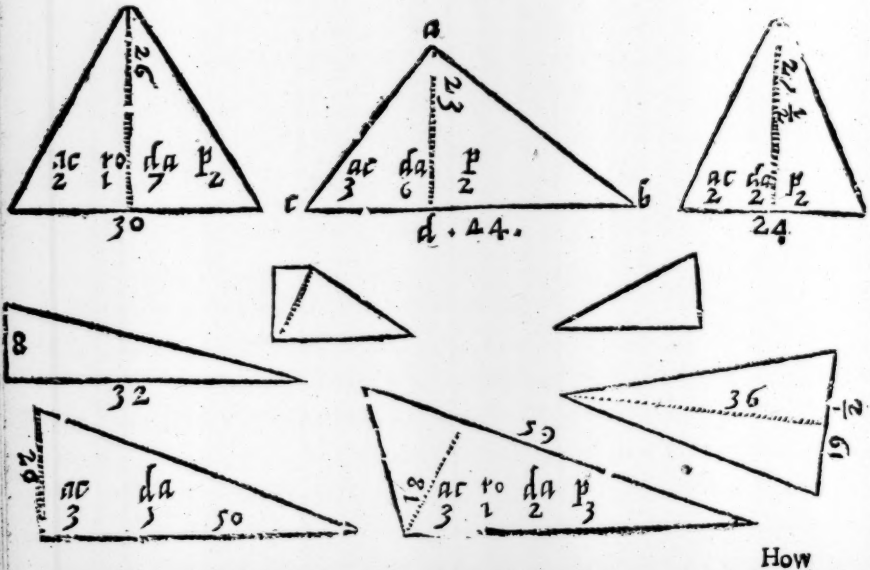
# The Art of

## How the right hanging line in Triangles is drawne.

*The ij. Chapter.*

To draw a hanging or plumbe line.

THis straight hanging line in all Triangles is euer drawne or imagined from any Angle, cutting some one side of that Triangle squirewise: as yee may perceiue the pricked lines in the Triangles following. By the helpe of this line, all Lands of Triangle fashion, are brought to bee measured as ensueth.




How

## How to measure all manner Triangled Land.

*The iij. Chapter.*

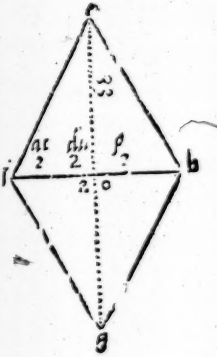
IF thou bee an Arithmetician, multiply this straight hanging line, drawne, as aboue is shewed, in halfe the number of Pearches of that side, which it cutteth Squirewise. For want of the knowledge, take the aforenamed Pearches (I meane of the hanging line, and halfe the side which he cutteth) and with that length and breadth enter your table of account, as there is set forth. So shall ye perceiue the number of Acres, Roods, Dayworkes, &c. Euclid. the 1. Booke 41. pro.

### Example.

FOr the perfect measuring of Triangles afore figured, and all other, suppose the second of these last nine figures of the other side, hauing written aboue it a. b. c. d. to bee a peece of land, whereof I would haue the true measure, I finde by a Corde, otherwise, the pricked hanging line a. b. to bee 23. Pearches: the side b. c. which it cutteth squirewise 44. Pearches, whose halfe is 22. With these 22. and 23. the conuenient length and breadth, I enter the table of account. There I finde by that Table at the corner where both the lines of conuenient length and breadth doe meete 3. Acres, 6. day workes, and two pearches to be in that Triangle. Thus of all be fore figured.

Here note your Table must euer bee entred with all the Pearches of the hanging line, and with halfe the side that bee cutteth squirewise. Or with the halfe hanging line, and the whole side cut. This Table followeth.

## A figure of a double Triangle.

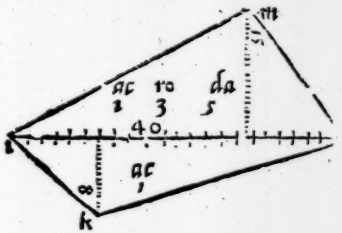


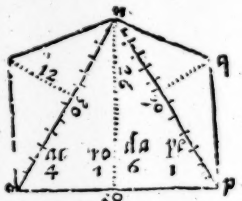

THis figure c.f.g.h. is but two Triangles: and therefore measured as aboue in two parts. Or thus: The hanging line c.g. is 33. Pearches: the side f.h. that hee cutteth squirewise 20. Pearches, the halfe of the which is 10. Now enter your Table as afore, with 33. and 10. the conuenient length and breadth. So shall yee finde two Acres, two Dayworkes, and two Pearches, the true content of this figure c.f.g.h.

### Another example.

Figures of many Angles.

ADmit i.k.l.m. land to be measured. Because it is no maner Triangle, it must be brought by imagination, as I haue said, into a Triangle or Triangles. Which imagination is heere signified by the line dashed i.l. Then as aboue is



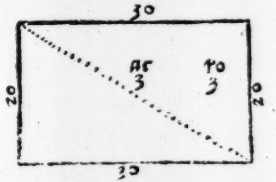

declared, it ought to bee measured (according to the rule of Triangles) in two parts, because there are two Triangles in that land. So by proofe ye shall find in the vpper i.m.l. one Acre, 3. Roodes, and fiue Dayworkes: in the other i.k.l. one Acre. Thus I gather the whole content of that Land, to bee two Acres, three Roodes, and fiue Dayworkes.

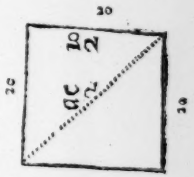
None

None otherwise of the adioyned n.o.p.q. and all other figures following: and other whatsoeuer they are, that by any meanes may be brought into Triangles.

Furthermore know that the figure i. k. l. m. is readily thus measured. Adde the Pearches of both the hanging Lines together: so haue yee 23. With this number, and with halfe the Pearches of the side, i.l. which he cutteth squirewise, being 10. Pearches, enter your Table. So is found as afore.

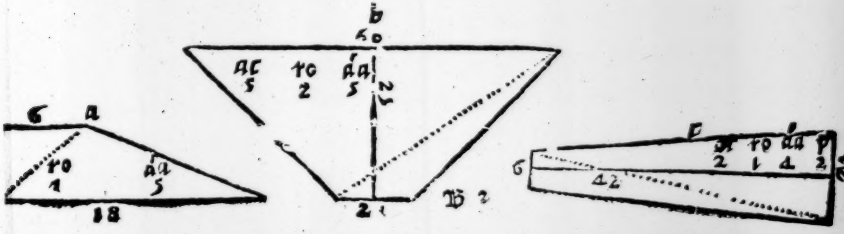
These two figures following may also bee thus measured, otherwise then by the rule of Triangles. Enter your Table with their conuenient length and breadth. So shall you finde the contents of all such.




These three figures following, although they may be measured by the rule of Triangles, yet for quicker speede, they haue also their proper measuring as ensueth.

Lay together the two sides which are paralels of the first figure a. that is 6. & 18. making 24. the halfe is 12. the breadth 5. Enter with 5. and 12. your table. So haue you one roode, and fiue day workes. For the other two b.c. and such like, ioyne the heads or ends in one: and enter your table with halfe of those Pearches, and with the whole number of the middle line.



## How by ſupputation to meaſure all triangled land.

To meaſure triangled land by ſupputation.

IOyne all the ſides together: take halfe out of that halfe, pull euery ſide, noting the difference. Then multiply the differences, the one in the other, and the third difference augment in the product. That which encreaſeth, multiply in the halfe of all the ſides ioyned. Then the Radix of the ſurmounting ſumme is the content of that Triangle.

foure rules ollowing.

Now reſt foure Rules to bee treated of. The firſt for all manner Regular ſquare Superficies. The ſecond for round Land, and her parts. The third for Steeples, Columnes, Globes, and their parts. The laſt for Mountaines, and Valleyes. Here they ſhall in order follow.

## A rule for all manner Regular or right ſquared Land of many ſides, as 5.6.7.8.9.10.20.100.&c.

*The iiij. Chapter.*

To meaſure land of many ſides.

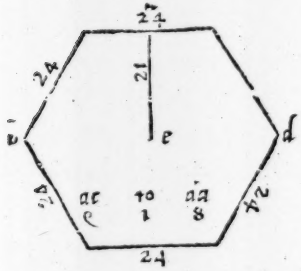
MEaſure and lay all the ſides together, taking the halfe number of Pearches there contained. Then draw a right hanging line from the Center or middeſt of that figure, or the middeſt of ſome one ſide. And with that length and the other, enter your Table. Note that the Triangle of all ſides like, and the Quadrate figure are alſo meaſured by this rule.

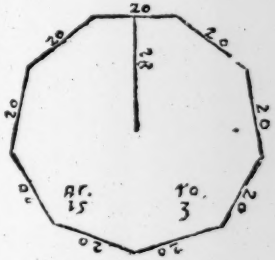
### Enſample.

SUppoſe this figure a.b.c.d. to bee a fire ſquare peece of Land, and euery ſide 24. Pearches. The halfe ſumme of all

all ſides is 72. Pearches: the right hanging pricked line a.c. 21. Pearches. With theſe two numbers wee muſt enter your Table of account following hereafter. And doe as is opened in the declaration there adioyned, when Numbers ſurmount the Table as they doe here.

So ſhall ye finde 9. Acres, 1. Rood, and 8. Dayworkes, the content of this figure a. b. c. d. Euen thus is the other nine ſquared figures meaſured, and ſuch like.




# A Rule for round Land, and the parts thereof.

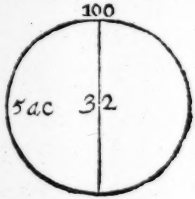
*The v. Chapter.*

HAlfe the Diameter multiplied in halfe the Circumference, ſheweth the content of any Circle.

Or thus more plainely. Yee ſhall enter your Table with halfe the number of pearches of the whole Circumference or compaſſe, and with the number of halfe the Diameter or breadth. So haue yee the Content. Archimedes in libello circuli menſurationis.

## Example.

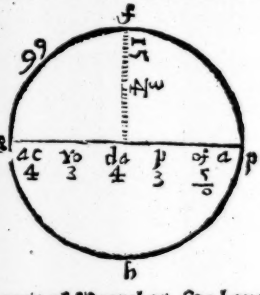
Suppose a peece of land, whereof the compaſſe is 100. Pearches, the breadth 32. Pearches, I would know how much Land is in this figure. Enter your Table with halfe the compaſſe, that is 50. and with halfe the breadth, that is 16. Pearches. Becauſe in the Table I cannot finde 50. for the greateſt length is 40. (therefore I enter with 40.) and 16. So is found foure Acres. Then I enter againe with 16. Pearches remayning, and 16. the breadth as before, that bringeth 1. Acre. Now to conclude by addition of 1. and 4. I finde five Acres in that round Land, whoſe halfe compaſſe is 50. Pearches, and the breadth 16. Pearches.




## How parts of Pearches are to be counted in meaſuring.

For perfect knowledge and uſe of this Table following, when parts of Pearches are adioyned, note well this other example that enſueth, and alſo what is ſaid of the declaration annexed unto the table, when parts of Pearches are in the length, breadth, or both.

Imagine e.g.h. to bee a round peece of Land: I finde by meaſure the whole Compaſſe, 99. Pearches. The halfe is 49. $\frac{1}{2}$. The hanging Line or halfe breadth is 15. $\frac{1}{4}$. Enter your Table with the whole Pearches, that is 49. and 15. leaving out $\frac{1}{2}$. and $\frac{1}{4}$. which were but parts of Pearches. So haue




yee

pee 4. Acres, 2. Roodes, 3. Dayworkes, and 3. Pearches. For thole parts of Pearches omitted, at your first entring the Table, worke thus. The halfe Pearch, Quarter, or other part of a Pearch in the length, must bee reckoned by themſelues in the whole breadth, and thoſe of the breadth contrariewiſe in the length. If there bee ſuch odde parts in both, then recken them of the length in the whole breadth, and them of the breadth in the whole length, ioyning to the other afore gotten, remembring the product of the one fraction multiplied in the other, to bee pulled from the encreaſe. To make this matter plaine, I will take this laſt example before. The one number wherewith I ſhould haue entred my table, was 49. $\frac{1}{2}$. the other 15. $\frac{1}{4}$. I found firſt by entring with 49. and 15. (omitting the odde parts) 4. Acres, 2. Roodes, 3. Dayworks, and 3. Pearches. Now for the encreaſe of the parts of Pearches left out, I muſt (as I ſaid) recken them of the length in the breadth, and contrariwiſe them of the breadth in the length. Halfe 15. $\frac{1}{4}$. is 7. Pearches, and $\frac{3}{8}$. Three quarters of 49. is 37. Pearches, $\frac{1}{8}$. Which added, makes 45. Pearches. This adioyned to the number afore gotten, bringeth the whole content of the round figure, which is 4. Acres, 3. Roods, 4. Dayworks, 3. Pearches, and $\frac{3}{8}$. of a Pearch, the product of the one fraction multiplied in the other ſubducted. What muſt be done when the numbers wherewith yee ſhould enter, exceede your table, counſell the declaration of your table there adioyned.

## Of the halfe Circle.

For this halfe circle, enter the Table with halfe the compaſſe, and with halfe the Diameter of the Circle, or with the length of the pricked hanging line, k.l. So the content of this halfe Circle is 2. Acres. 1. Roode, 7. Day worke, 1. Pearch, and $\frac{1}{16}$. of a Pearch.

To meaſure halfe circled Land.

Another

## Another example of Portions and parts of a Circle.

SUppose n.m.o. following, were part of a Circle or peece of Land, whose Content we desired. The whole compasse of the Circle which this portion representeth, is (as afore-said) 99. Pearches: his Diameter or breadth 31. ½. The pricked Arke or Compasse, n.m.o. is 74. Now with the halfe Breadth or Semidiameter of the Circle, 15. ¾. and with 37. the halfe of the pricked Compasse: enter your Table. So haue yee 3. Acres, 2. Roodes, 5. Day workes, 2. Pearches, and ¾. of a Pearch, the Content of the peece of Land full of prickes, to the sides of the Triangle pricked.

To measure parts of circled Land.

If ye desire to know the sum of Pearches in the other portion beneath the Triangle, separated by the Line n.o. yee must adde the Content of the Triangle (which is 3. Roodes and ¾. of a Pearch, found by the Rule of Triangles) to the Acres and Pearches before searched. So haue ye 4. Acres, 1. Roode, 5 Day workes, three Pearches, and ½. of a Pearch.

This substracted or pulled from the number contained in the whole Circle, the remaine is the Pearches included in the small peece beneath the Triangle. That is, 1. Roode, 36. Pearches, and ½. of a Pearch.

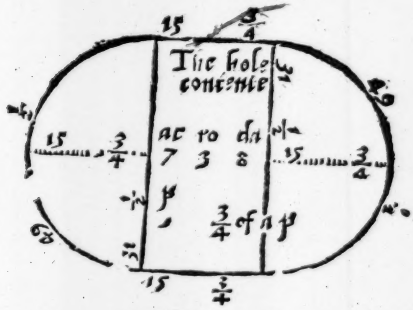
## How mixed Figures are measured.

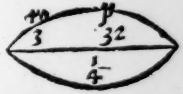
Land compounded of circles, or his parts.

I Thinke none now will doubt how these two figures following are measured, because they are made of portions or parts of Circles, whose measure is before sufficiently ope-

ned

ned, the one consisting of two halfe Circles, and a Quadrangle: the other being the portions of the Circle, m.o. doubled.




If any euill fashioned Land chance to bee measured, which requireth to be brought into many Triangles, to sane labour, yee may adde some portion vnto that, and make it Square, or otherwise. So let them bee measured: and after, from the product pull away that yee added: the remaine is the Content.

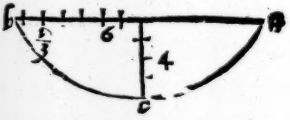
## To finde the content superficiall of Steeples, Columnes, Globes, and their parts.

TO the Arithmetician, I say: for picked Steeples, multiply the whole side in halfe the circumference of the Base, adding the plaine of that Base. For pillers: augment the Circumference of the Base in the Heighes, putting to the plaine of both Bases. For Globes, the diameter in the Circumference multiplied. Euen so of fragments or parts. Let them that bee voide of Arithmetike enter my Table of account following, with such numbers as I now willed the Arithmetician to multiply, not forgetting what I haue before written. So I serue their turne. To measure Steeples, Columnes, Globes, &c.

# The Art of measuring

## Or thus by the rule of proportion, the parts of a Globe are found.

To measure parts of Globes.




Suppose a. b. c. to bee a peece of a Globe, and 4. to be a proportion of the Diameter, the whole being 14. Thus I say, 14. the whole Diameter giueth 616. the Content superficiall of the Circle: what shall 4. bring: So haue yee 176. which is the Content of that piece.

## To finde the Diameter by some knowne portion thereof.

To finde the vnknowne Diameter of a Globe.

If ye bee ignorant what length the Deameter of the Globe is, whose proportion yee haue, the height or part of the Demecient being 4. foot, augment halfe the line a. b. which is 6. $\frac{1}{3}$. in himselfe, and the product diuide by 4. So haue yee 10. to be added to 4. which maketh 14. the whole Diameter.

## The true measuring of Mountaines and Valleyes.

*The vi. Chapter.*

To measure Mountaines.

First ye shall measure the circuit of the Foot, or Base of the Mountaine: then the compasse of the summity or top, adding them together. So shall ye doe of the Ascenses, that is, the going vp from the foot to the top, ioyning the measure of the longer and shorter in one. Now take the halfe of the circuit added, and the halfe part of the Ascenses ioyned, and enter your table: there shall ye see the Content.

Ensample.

Enſample.

A.b.c. is the mountaine: a.c. the circuit of the Baſe, being 100. Pearches, b. the top 16. Pearches. Which ioyned together, make 116. b. c. the one Aſcenſe is 55. Pearches: the other 75. Theſe added make 130. The halfe of the circuits is 58. the halfe of the Aſcenſes 65. with theſe two ſummes yee ſhall enter your table of account, where ye ſhall find 23. Acres, 2. Roodes, and 10. Pearches, the true content of this figured hill.

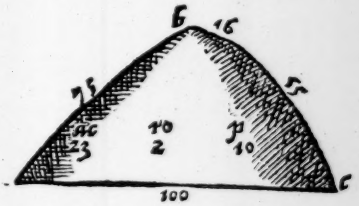



Figure of a Mountaine.

## Of the Valley.

AS in the Mountaine yee meaſured the circuit or compaſſe of the Baſe or Foote: ſo here contrary yee ſhall meete round about the circuite or compaſſe of the height of the Valley. And as yee got the meaſure or compaſſe of the top of the Mountaine, ſo meaſure the circuite of the depth of the Valley. In like manner as yee meaſured the Aſcenſe, that is, the going vp from the foote to the top: ſo meaſure the Deſcenſe or going downe of the Hill to the depth of the Valley. The reſt all worke, as I haue ſhewed you in meaſuring the Mountaine. For more plainneſſe, behold this enſample or figure. If yee lay together the circuites of the height and depth, which is 210. and 30. taking the halfe art of thoſe two Circuites, making

To meaſure Valleyes.

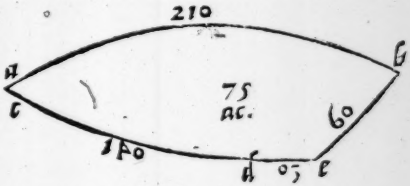



Figure of a Valley.

an 120. then the two Ascenses 140. and 60. added in one product 200. the halfe thereof being 100. with this and 120. the other halfe of the Circuite, ye may enter your table. That doing, loe 75. Acres.

## How the Table of account now following, is to be vsed.

What is to bee done when numbers, with which you should enter, exceede your Table.

When you haue gotten a conuenient Length and Breadth (as I haue aboue declared by diuers triangles and other figures) then you shall enter this Table. Seeke there the Length, and most number of Pearches in the higher margine, which beginneth at 1. and endeth rightward at 40. Looke the other summe of Pearches (I meane the breadth) in the right side and hanging margine, from 1. descending to 30. Now at the meeting of the lines, where the one answereth the other directly in a square, you shall finde the Acres, Roodes, Day workes, and Pearches. Note that the first number set on the left side, and vpper part in any square, signifieth the number of Acres. The figure 1. set in the vpper part, and right side, doth betoken a Roode: the figure 2. there two Roodes. 3. three Roodes. And the figure in the left side beneath, signifieth a Day worke, or Day workes. A figure in the lower part rightward, declareth Pearches.

## A Declaration adioyned.

When it chanceth that the one number or both with the which ye should enter this table, are greater then any here found: it behoueth you to take the halfe of the one, and the whole of the other, or what parts ye list of both, most commodious for your purpose, and so enter your table. Looke then what is there found, and it shall beare his name of the parts multiplied in themselues.

Ensample.

## Enſample.

Suppoſe the number with the which yee ſhould enter your table to bee 130. Pearches in length, and the breadth 60. neither of theſe may be found in the Margines: wherefore I take the third part of an 130. which is 34. Pearches, and one remaineth.

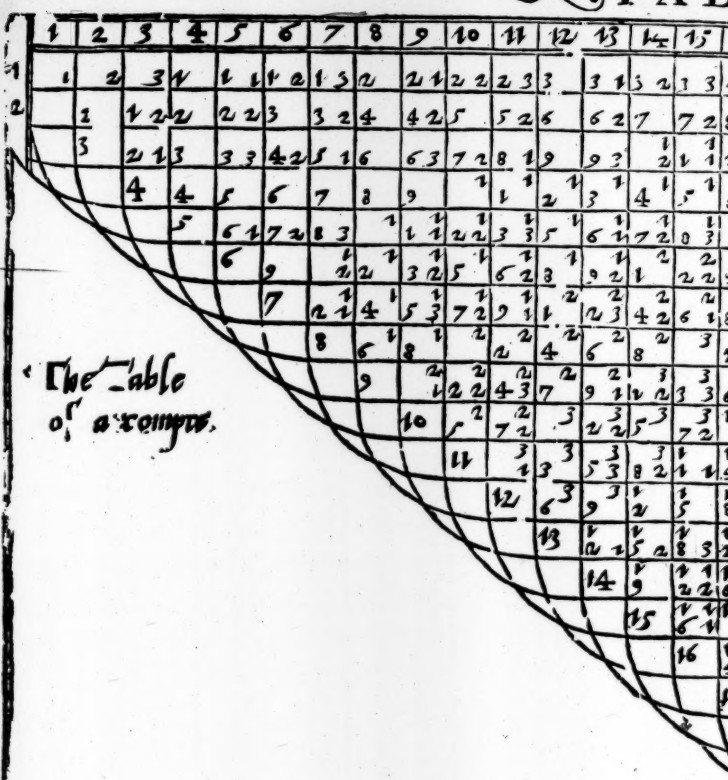
The halfe 60. that is 30. I finde with entring them at the common meeting, 6. Acres, 1. Roode, and 5. Day worꝛkes. This ſumme muſt haue his name of the parts augmented in themſelues. I tooke the third part of the one, and halfe the other number, therefoꝛe 2. muſt be multiplied in 3. oꝛ contrarie: ſo haue ye fire, which ſignifieth that ye haue found by entring, but the ſixth part of the number ye ſhould finde. Wherefoꝛe I muſt take this ſumme toſoꝛe found (being Acres, 1. Roode, and 5. Day worꝛkes) fire times as much. So haue ye 33. Acres and one Roode. Foꝛ the Pearch remaining in length, reckon him in the breadth (as is afoꝛe declared) in the fifth Chapter of the Remaines: ſo haue yee 60. Pearches moꝛe to be added. So the encreaſe of theſe two numbers, 103. and 60. amount to 38. Acres, two Roodes, and 5. Day worꝛkes. Thus any manner length and breadth is reduced to this table following, which ſufficeth.

Looke what I haue ſhewed in the Chapter of parts, that vnderſtand here of whole Pearches, leſt ſubſtracting, &c.

Thus with few woꝛds is ended the certaine meaſuring of all manner Land, touching the Superficiall Contents. Wherefoꝛe now ſhall follow the true meaſuring of Timber, Stone, Steeples, Pillers, Globes, accoꝛding to their Craſſitude.

Such as are altogether ignoꝛant of Arithmetike, may reckon by our Engliſh coyne, allowing foꝛ euery Pearch in length oꝛ breadth a penny, and ſo euery Marke makes an Acre, euery Noble halfe an Acre, euery foꝛty pence oꝛ halfe Noble, a rood, and euery penny a ſquare Pearch. And ſo by memoꝛie without tables, may in ſome rude and groſſe manner, caſt vp reaſonable iuſt the true Contents of all Cloſes, Medowes, Marſhes, Pils oꝛ Valleyes.

# TAB



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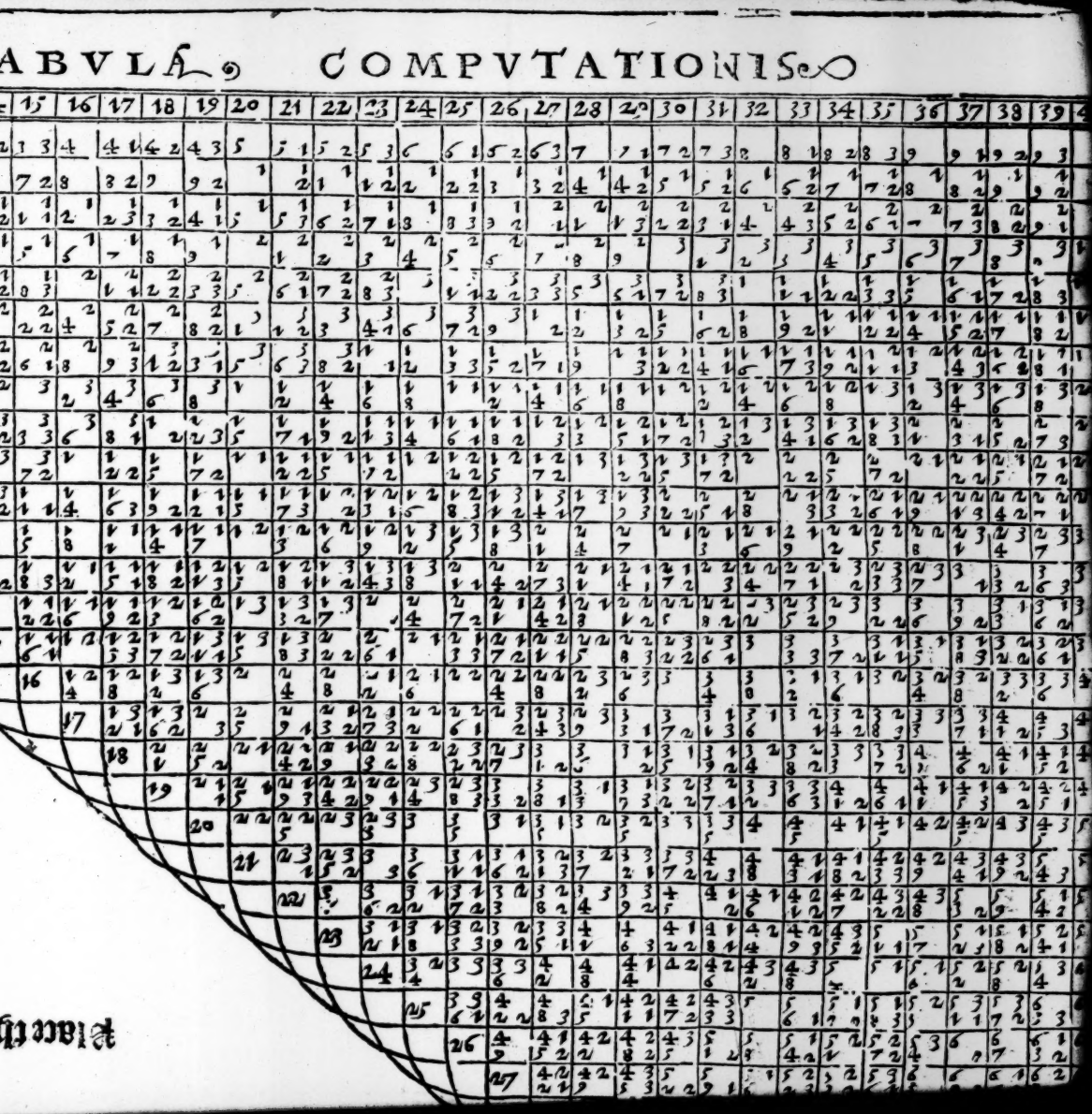

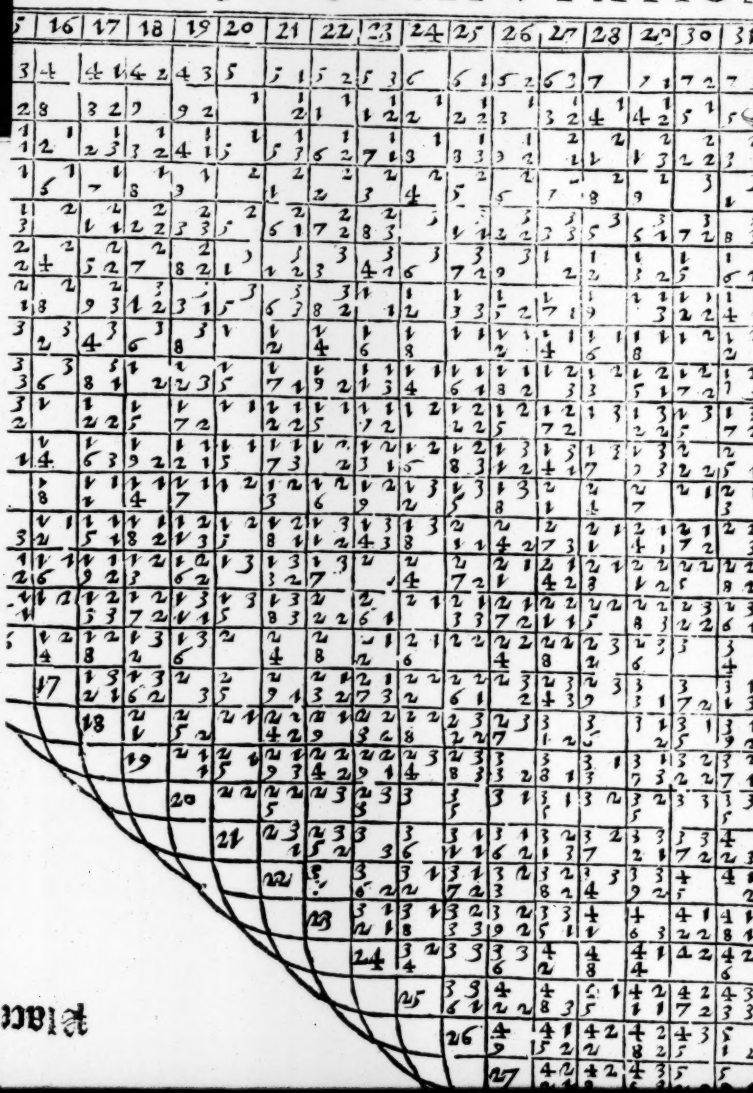

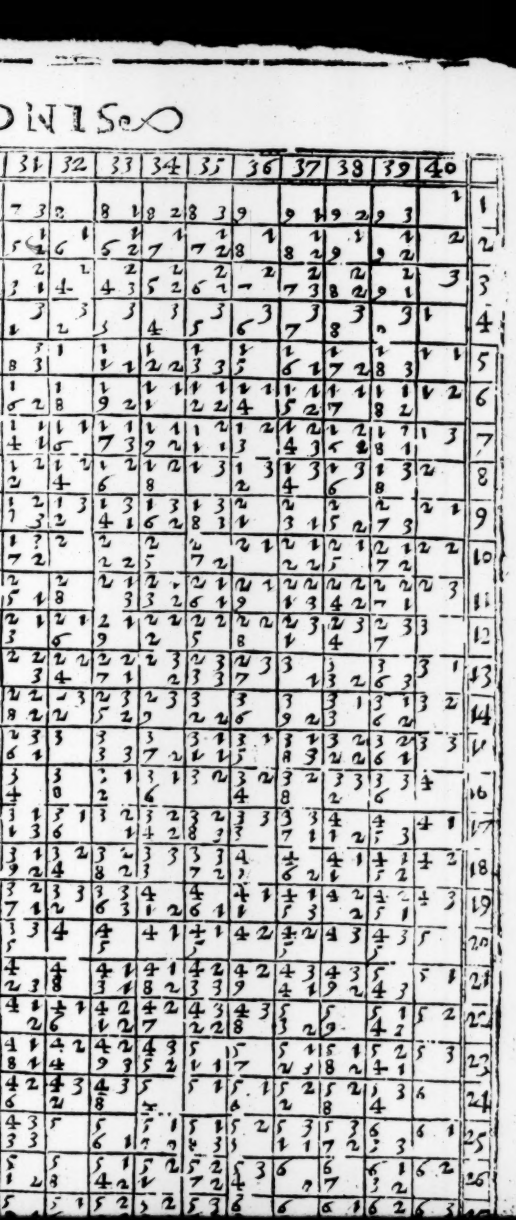

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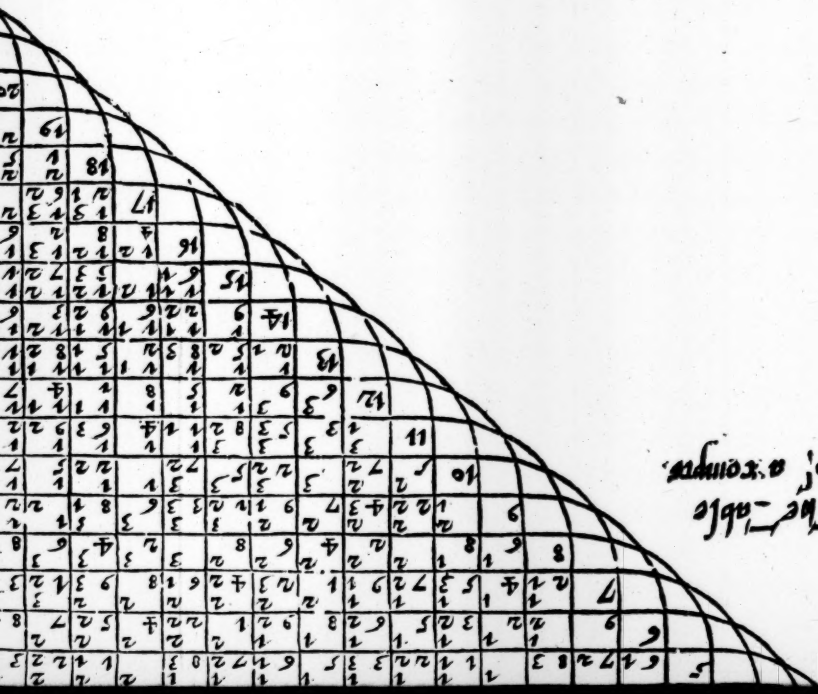

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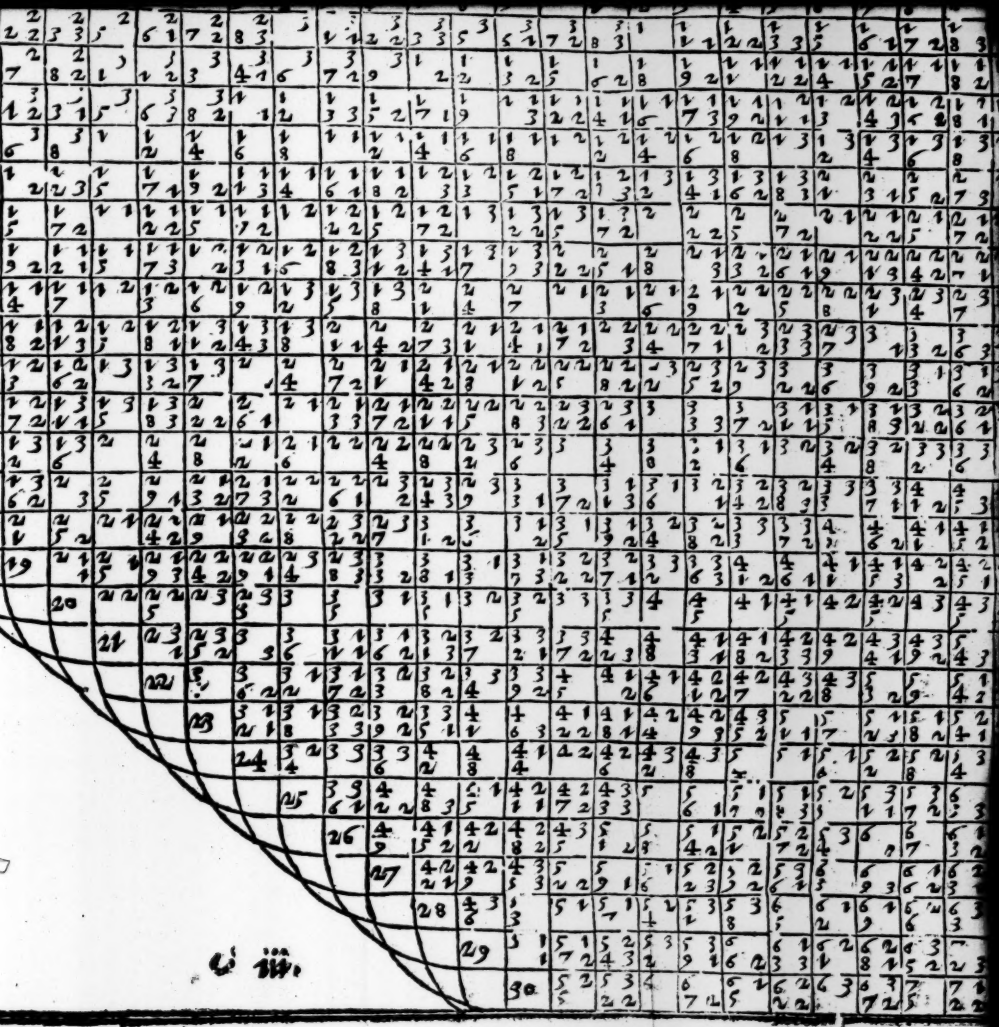
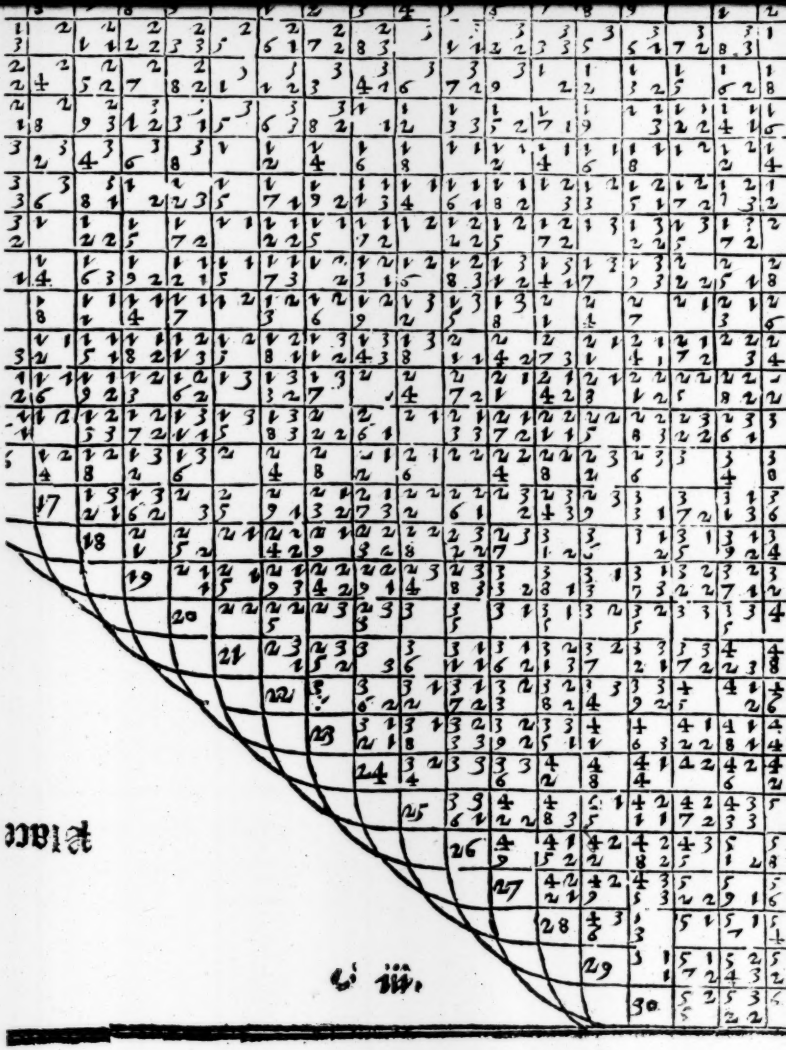
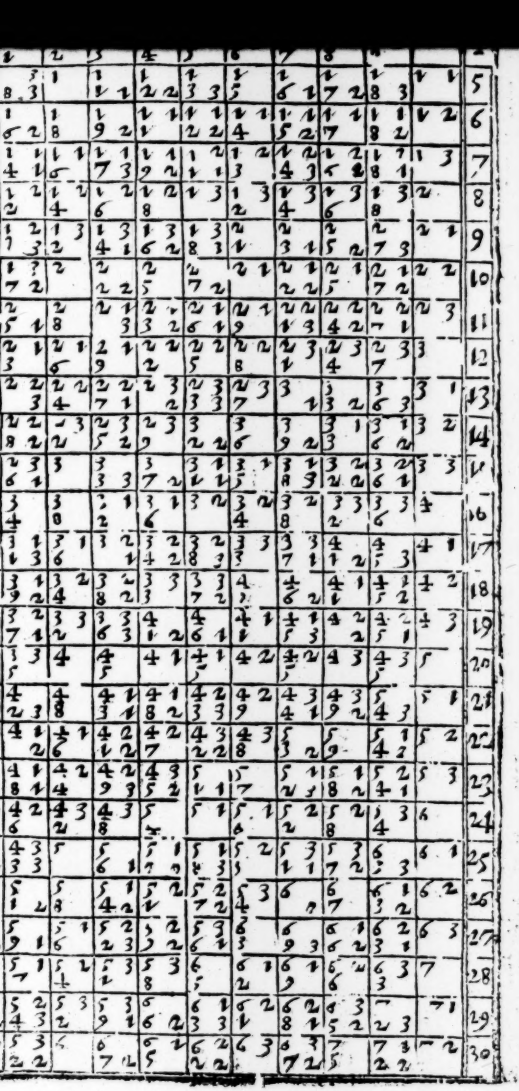






# To the Reader.

IT commeth commonly to paſſe, that Carpenters, Maſons, and ſuch like Artificers, are put either to meaſure timber euery way ſquare, or ſquared logs, broader on the one ſide than on the other: yea many times mutilate or vnperfect ſtuffe. Sometimes three, fiue, tenne, or twenty, ſquare in the head, and ſo through: oftentimes round Stone or Timber with hollowed, &c. Afore I ſhew vnto them what muſt bee done with ſuch pieces of Timber or Stone, to get their true meaſure, my deſire ſhall bee that ſuch Craftſmen will leaue to be heady or ſelfe willed: yea ſo greedily to ſticke to their corrupted rules, that vtterly they refuſe to be taught.

Both learning and experience declareth vnto me, that the grounds which the beſt of them haue, are falſe. To open how and where, it needeth not: neither doth it appertaine to inſtruction, onely it may ſuffice him that liketh the true way, here to receiue it appointed to him. Yet to ſatisfie and content him which will not beleeue any ſuch errours or falſe grounds to bee, I ſay (and truely) that the Ruler of Timber meaſure, which the moſt part of them hath, is not made by right Art: Beſides that, their craft in ſeeking the Square of ſome Timber is very falſe. They vſe in meaſuring, to lay the broader and narrower ſides together in a ſumme, and to take the halfe of that number for the Square. Then they ſeeke this vntrue Square vpon the falſe Ruler, and ſo meaſuring the Timber, they conclude of it vntruely.

As

In a foote ſquare is contained 172. Inches.

As this is corrupted, ſo are other Grounds which they take to be infallible. Now to the purpoſe: touching the correction of thoſe Errours, with other not mentioned, whereby true meaſuring may enſue, this way ſhall be taken. After I haue opened how you muſt handle all ſuch faſhioned Timber (as afore is ſpoken of) there ſhall follow a Table in which yee may finde (as I will declare) the Square of any Stone or Timber. That knowne, it is requiſite to haue another Table immediately following, which may appoint to all true Squares from 1. to 6. inches, the iuſt length to make a foote euery way Square. With the length agreeable to your Square, your Logge muſt bee meaſured. And as oft as ye finde it from the one end to the other of your Timber, ſo oft you may conclude the foot Square to bee contained in that Timber Logge, or Stone: that is, ſo many Square Feet there to bee included. This Table of Timber meaſure ſtandeth in the place of a good Ruler, well decked with true meaſures. By this yee may make or correct Rulers at pleaſure, as after appeareth.

*Now orderly followeth the true meaſuring of all faſhioned Timber or ſtone aforenamed.*

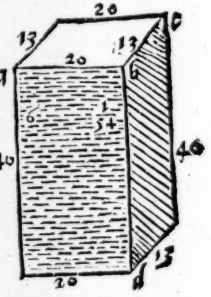
# How Timber or Stone foureſquare euery way, or broader on the one ſide than on the other, is meaſured.

*The vij. Chapter.*

IF a piece of Timber or Stone, bee either equally ſquare, broader on the one ſide, than on the other, yee ſhall take the iuſt meaſure, I meane, how many Inches the broader ſide containeth: euen ſo of the narrower. This done, yee muſt ſeeke in the Table of ſquares following, the meaſure of the broader ſide of the Timber or Stone, in the vpper margine of that Table. Then looke for the number of Inches, of the equall or narrower ſide, in the right part and hanging Margine. At the common meeting where the one number anſwereth directly to the other, there your true Square ſhall appeare. This ſquare ſo found, ſhall bee referred to your Table of Timber meaſure: in the which you may plainely ſee (if you runne downe by the left Margine, vntill your Inches ſquare appeare) how many Feet or Inches of your Ruler belong to a Foote ſquare. As often as that meaſure there found, is contained in the Timber or Stone, ſo often and as many Feete ſquare yee may conclude (without doubt) the piece of Timber or Stone to haue.

## Ensample.

Suppose this squared Timber or Stone a. b.c.d. were to be measured, the broader side a. b.20. Inches, the narrower side b. c. 13. Inches, the length 40. Inches. Now I must seeke the broader side 20. in the vpper Margine of the table. The narrower side 13. must bee found in the right side and hanging Margine. At their common meeting 16. Inches, and $\frac{1}{8}$. part of an Inch shall appeare. This true square must bee searched for in the table of timber measure. Therefore looke for 16. in the Margine of this table. In the Squares with him rightward, ye shall finde 6. inches, and $\frac{3}{4}$. which is three quarters of an Inch. Some deale lesse of your Ruler than 6. and $\frac{3}{4}$. laid out vpon the timber, maketh a Foote Square. And that measure so directly handled, is contained in the Length of your Timber fiue times. Wherefore affirme fiue Foote there to be, beside that is left $\frac{1}{32}$. part of a Foote. Note because the Squares at all times (in this Ensample) rise not to euen Inches, but sometime to odde parts: therefore according to your discretion, adde or take away some part more or lesse in setting forth the Foote Square, as aboue is performed.




It were intolerable tediousnesse, yea impossible to set forth the true quantities of timber measure, to all odde Quantities of Squares. The discreete handling of these, the wittie shall bring to a sufficient exactnesse.

## Of Timber or Stone, 3.5.10.20. or moe ſides Square, &c.

*The viij. Chapter.*

When Timber hath diuers equall Squares in the head, and ſo through: firſt, meaſure all the ſquare ſides round about the head or end of the Timber. Then take halfe the number of the whole meaſure for one breadth.

Then meaſure from the Center (which is the middle of the head, or end of the Timber) to the middeſt of the Square ſide, betweene the two Angles, and take the meaſure of that diſtance for the other breadth. Now reſort with the meaſures of theſe two breadths, (as before) to the Table of Squares: ſeeing the bigger number or breadth in the vpper Margine, and the other leſſer in the ſide Margine. With the ſquare there found, haue recourſe to the Table of Timber meaſure, and doe as I haue inſtructed.

Enſample.

Admit this ſmall piece of Timber fiue ſquare, e.f.g.b. ſhould bee meaſured, euery ſide being 12. Inches. If ye adde together in one ſumme all the fiue ſides, they make 60. Inches. The halfe is 30. that ſerueth for one breadth. Then the Line e.f. which goeth from the Center or middeſt of the Square, to the middle of one ſide, is 8. Inches. The two number 30. and 8. muſt be ſought (as before) in the table of ſquares following. At the common meeting, your ſquare ſhall appeare 15. Inches, & $\frac{1}{2}$. This ſquare 15. ſeeke in the Table of Timber meaſure. There yee may ſee right with it 7. Inches, and $\frac{2}{3}$. Now becauſe of $\frac{1}{2}$. the odde quantitie of the

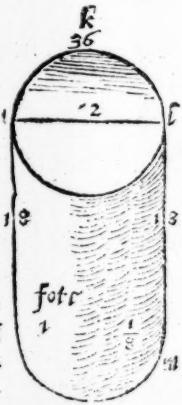
Square aboue 15. Inches, lay something lesse. Then see how oftentimes that measure (so with discretion handled) is from the one end of your Timber to the other: and affirme so many times a Foote square there to be, as that measure is found in the length of your Logge.

## How round and hollow Timber, Steeples, Pillers, Globes, &c. are to be measured.

*The ix. Chapter.*

FIrst gird the Logge round about with some Line: then diuide the Line which compasseth that timber in two equall parts: keepe the one part for the bigger breadth. After, ye shall diuide againe that whole length (the two and twenty part cast away) in three parts, and take the halfe of one of them for the other narrower breadth. With the measures of these two breadths, haste to your table, performing all things as afore is opened.

Ensample.




Suppose this little piece of Timber, i.k.l.m. were to be measured, the compasse or girding 36. Inches, and the halfe of that is 18. being the one breadth: then the third of 36. is 12. the halfe of it is 6. which is the other narrower breadth, with these two numbers 6. and 18. enter the Table of squares following, and so the table of Timber measure. At the last (all things performed as before) yee shall finde in this round Logge, the length l.m. being 18. Inches, 1. Foote, and $\frac{1}{8}$ part of a Foote. This is sufficient for all such like.

## A note of hollowed Timber.

IF it chance that hollowed Timber bee to bee meaſured: meaſure the whole Logge as though it were not hollow, as aboue is declared. Then meaſure the narrower and broader ſide of the hollow, and ſee what is contained in that, as though it were maſſie Timber. Now pull out the content of it, from the whole aboue meaſured: the remaine of force muſt ſhew what timber is included in that hollowed body.

I Am vnable in few words to expreſſe to the vnlearned, by what meane Pyramidall, or picked regular Steeples of all faſhions are meaſured. Alſo how Pillers, how the content of Globes or Bowles are ſearched, vnleſſe the Art of numbring were taſted. That being knowne: thus (as now followeth) I teach.

## How the craſsitude of picked Steeples is knowne.

MUltiply the plaine of the Baſe in the third part of the Height: ſo yee haue the Craſſitude. Or multiply the Content ſuperficiall (found as I haue inſtructed) in the Height of the Steeple, taking for your purpoſe the third part of that product.

## How the Content of Pillers is knowne.

ENcreaſe the Baſe plaine in his Altitude or Height: ſo haue ye your deſire.

# The Art of meaſuring

## How the Cubicall bodies of Globes are ſearched.

The content Superficiall found, (as I haue opened) muſt be multiplied in the ſixth part of the Diameter: the product is that wee require: Or the third part of the ſuperficiall Content in halfe the Diameter. Or multiply the plaine of the Circle in the whole Diameter: then take two third parts, which added, make the Traſſitude.

## Of the halfe Circle.

His Superficiall Content multiplied (as I ſaid) bringeth the magnitude of him. If any man require enſamples of theſe laſt matters, or more ſufficient handling: let them reſort vnto my bookes publiſhed of Geometrie, where they ſhall be ſatiſfied. Theſe little appertaine to Carpenters or Maſons: therefore not by enſample declared.

## A generall note.

When thou ſhalt bee put to meaſure ſome Body, without order or faſhion, lacking part of his Square, or hauing more than his Forme: if it lacke thou ſhalt make it perfect, by obſeruing diligently the running together of the ſides. The parts wanting ſhall bee meaſured, as though they were there, which portions muſt be taken from the whole Body meaſured.

Alſo when there reſulteth any more than the forme or Regular Square: firſt meaſure the ſquare Body: then the Traſſitude which aboundeth. All put together, doe ſhew the whole irregular Body. This ſufficeth.

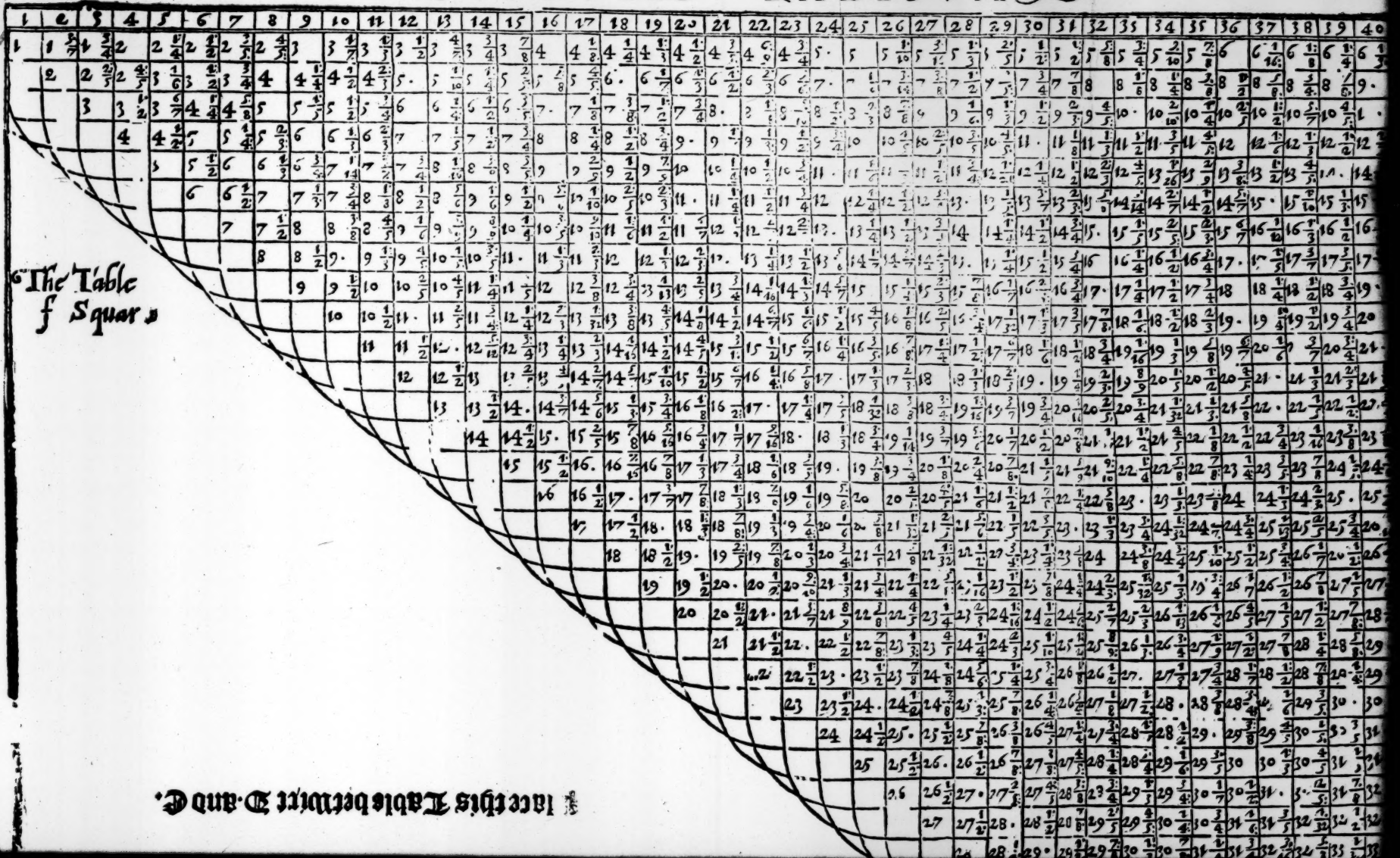
# A Table to finde the iuſt Radix or Square of any Timber or Stone.

IT behoueth you to know, that this table following is made for the true ſquare of any manner timber: therfore vnderſtand that the numbers from 1. to 40. ſet aboue in the high Margine, betoken the Inches of the broader ſide of the timber. And the numbers from 1. and ſo downeward to 30. put in the right part and hanging Margine of this table, ſignifie the Inches of the narrower ſide: and to conclude briefly, the Element or figures ſet in euery ſquare roome, betoken the iuſt ſquare. The bigger figures leftward in euery ſquare place, ſignifie the whole Inches. And the other leſſer rightward in the ſame ſquare diuided by a line, the parts of Inches, as $\frac{1}{2}$, &c.

This firſt Fraction toward the left hand, betokeneth one halfe part of an inch: the other two fifts of an Inch, and euery figure or fraction hauing a point adioyned vnto him, ſome deale leſſe than that part is: as that part, $\frac{1}{2}$ repreſenteth ſcant halfe an Inch, a very little quantitie leſſe. And if it had two pyckes by him, he ſhould haue declared ſome quantitie more: as this other fraction or part, $\frac{2}{5}$: which is more than two fifts, a ſmall deale.

It had not beene needfull to haue put the parts of the Square ſo preciſely as they are here: neither is it requiſite ſo curiouſly to take them.

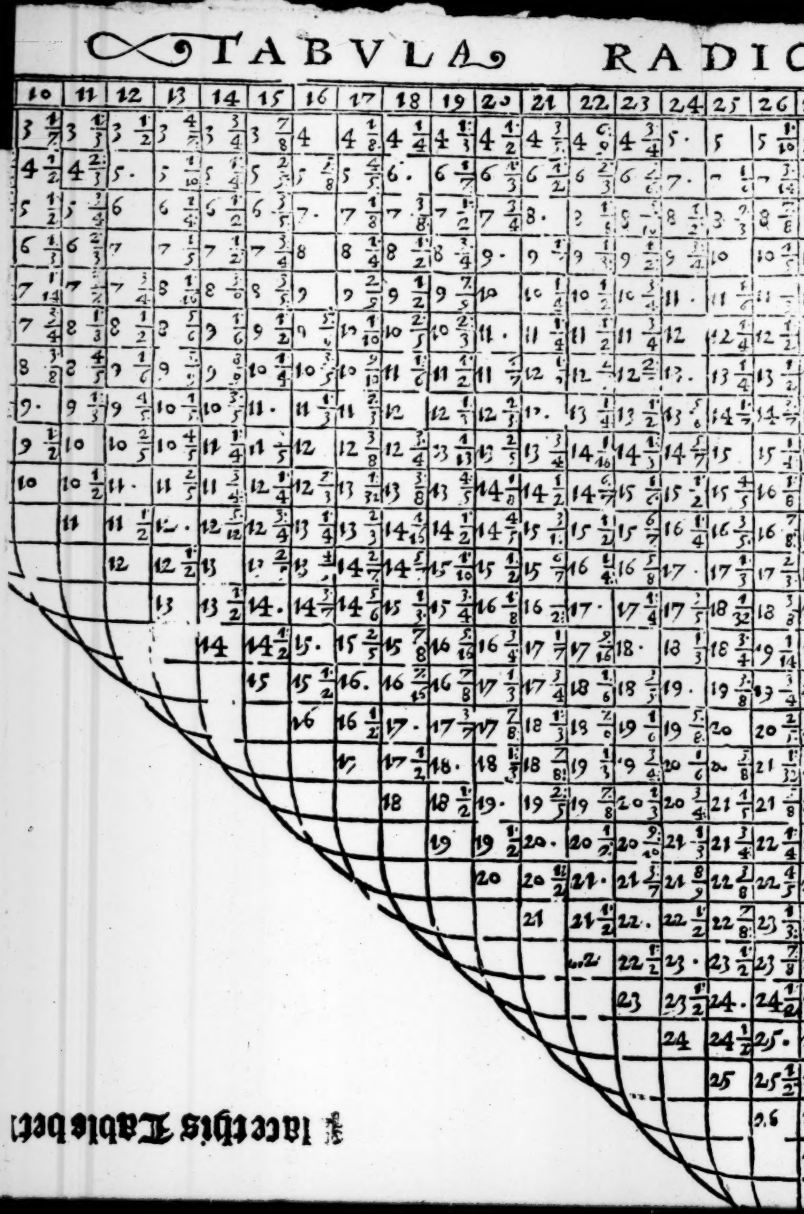
# TABVLA RADICVM



The Table f Squar

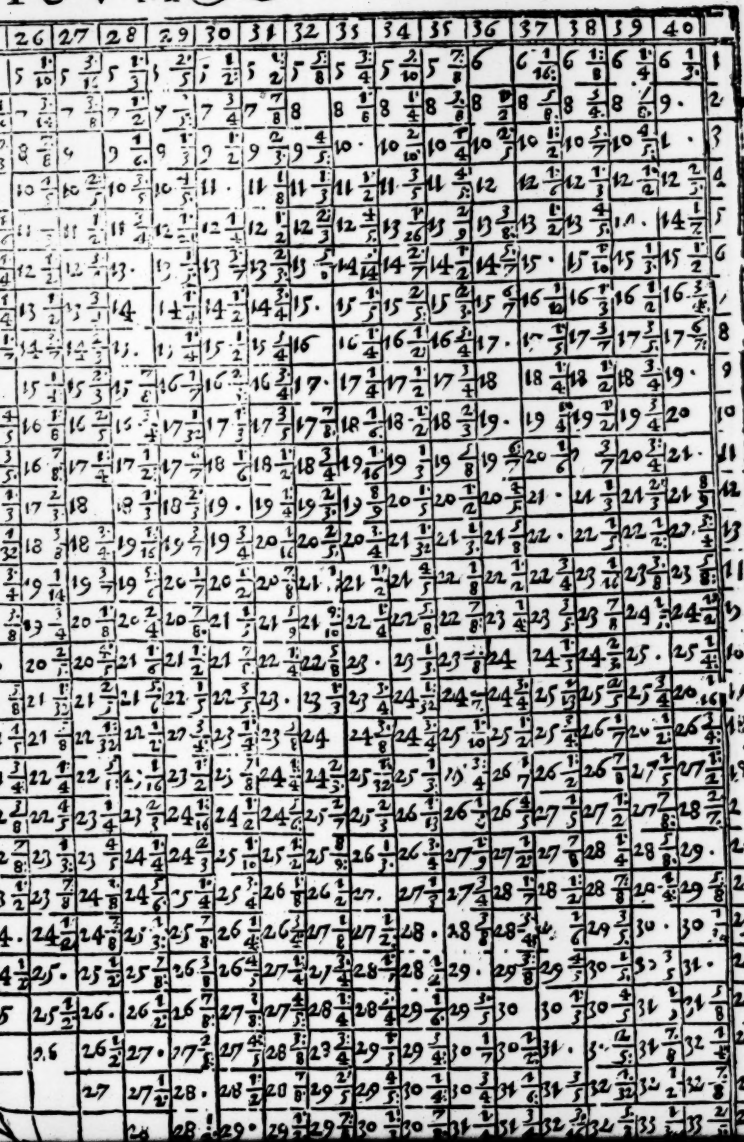
lace this Table betwixt D. and E.

# TABVLA RADIO

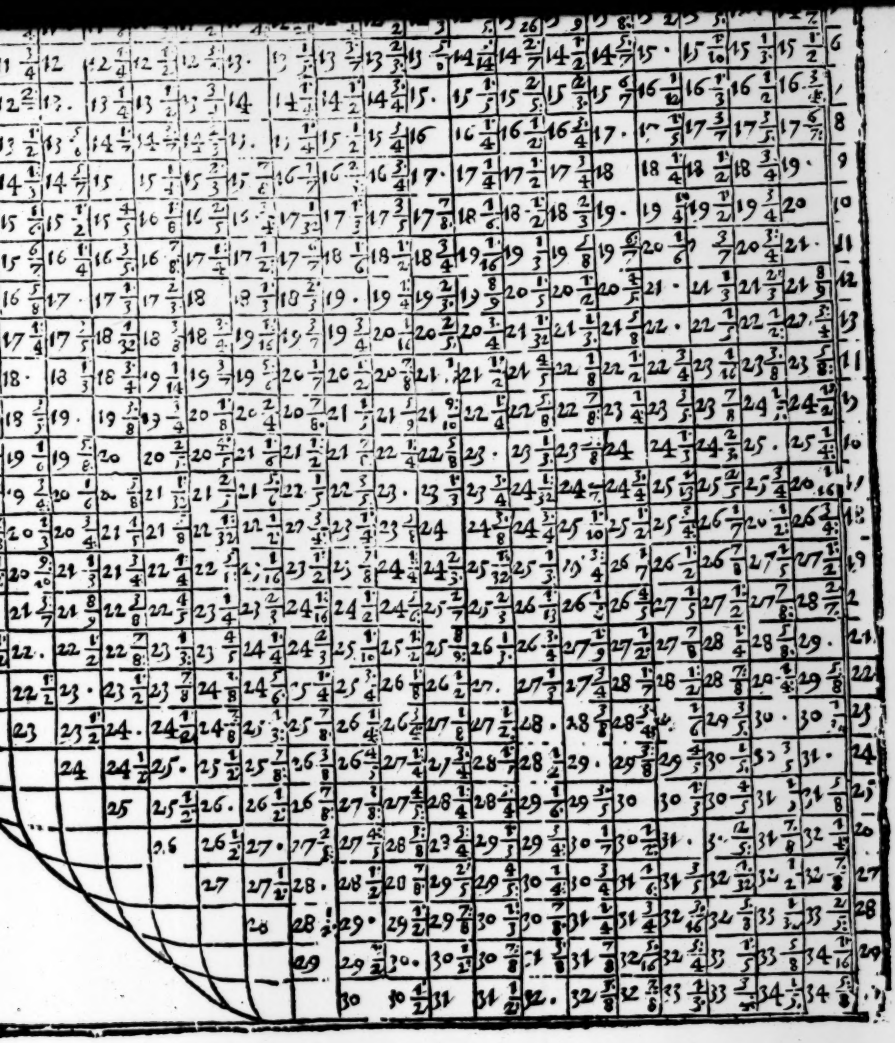


| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 1/7 | 3 1/3 | 3 1/2 | 3 4/7 | 3 3/4 | 3 7/8 | 4 | 4 1/8 | 4 1/4 | 4 1/3 | 4 1/2 | 4 3/5 | 4 6/9 | 4 3/4 | 5. | 5 | 5 1/10 |
| 4 1/2 | 4 2/3 | 5. | 5 1/10 | 5 1/4 | 5 2/5 | 5 5/8 | 5 4/5 | 6. | 6 1/7 | 6 1/3 | 6 1/2 | 6 2/3 | 6 3/4 | 7. | 7 1/6 | 7 3/14 |
| 5 1/2 | 5 3/4 | 6 | 6 1/4 | 6 1/2 | 6 3/5 | 7. | 7 1/8 | 7 3/8 | 7 1/2 | 7 3/4 | 8. | 8 1/6 | 8 5/16 | 8 1/2 | 8 2/3 | 8 7/8 |
| 6 1/3 | 6 2/3 | 7 | 7 1/5 | 7 1/2 | 7 3/4 | 8 | 8 1/4 | 8 1/2 | 8 3/4 | 9. | 9 1/7 | 9 1/3 | 9 1/2 | 9 3/4 | 10 | 10 1/5 |
| 7 1/14 | 7 3/7 | 7 3/4 | 8 1/10 | 8 3/8 | 8 3/5 | 9 | 9 2/9 | 9 1/2 | 9 7/9 | 10 | 10 1/4 | 10 1/2 | 10 3/4 | 11. | 11 1/6 | 11 [illegible] |
| 7 3/4 | 8 1/8 | 8 1/2 | 8 5/6 | 9 1/6 | 9 1/2 | 9 5/6 | 10 1/10 | 10 2/5 | 10 2/3 | 11. | 11 1/4 | 11 1/2 | 11 3/4 | 12 | 12 1/4 | 12 1/2 |
| 8 3/8 | 8 4/5 | 9 1/6 | 9 5/9 | 9 8/9 | 10 1/4 | 10 3/5 | 10 9/10 | 11 1/6 | 11 1/2 | 11 5/7 | 12 1/2 | 12 2/3 | 12 2/3 | 13. | 13 1/4 | 13 1/2 |
| 9. | 9 1/3 | 9 4/5 | 10 1/5 | 10 3/5 | 11. | 11 1/3 | 11 2/3 | 12 | 12 1/3 | 12 2/3 | 13. | 13 1/4 | 13 1/2 | 13 5/6 | 14 1/7 | 14 3/7 |
| 9 1/2 | 10 | 10 2/5 | 10 4/5 | 11 1/4 | 11 3/5 | 12 | 12 3/8 | 12 3/4 | 13 1/13 | 13 2/5 | 13 3/4 | 14 1/16 | 14 1/3 | 14 5/7 | 15 | 15 1/4 |
| 10 | 10 1/2 | 11. | 11 2/5 | 11 3/4 | 12 1/4 | 12 2/3 | 13 1/32 | 13 3/8 | 13 4/5 | 14 1/8 | 14 1/2 | 14 6/7 | 15 1/6 | 15 1/2 | 15 4/5 | 16 1/8 |
| | 11 | 11 1/2 | 12. | 12 5/12 | 12 3/4 | 13 1/4 | 13 2/3 | 14 1/16 | 14 1/2 | 14 4/5 | 15 3/10 | 15 1/2 | 15 6/7 | 16 1/4 | 16 3/5 | 16 7/8 |
| | | 12 | 12 1/2 | 13 | 13 2/5 | 13 4/5 | 14 2/7 | 14 5/7 | 15 1/10 | 15 1/2 | 15 6/7 | 16 1/4 | 16 5/8 | 17. | 17 1/3 | 17 2/3 |
| | | | 13 | 13 1/2 | 14. | 14 3/7 | 14 5/6 | 15 1/3 | 15 3/4 | 16 1/8 | 16 1/2 | 17. | 17 1/4 | 17 3/5 | 18 1/32 | 18 3/8 |
| | | | | 14 | 14 1/2 | 15. | 15 2/5 | 15 7/8 | 16 5/16 | 16 3/4 | 17 1/7 | 17 9/16 | 18. | 18 1/3 | 18 3/4 | 19 1/14 |
| | | | | | 15 | 15 1/2 | 16. | 16 7/16 | 16 7/8 | 17 1/3 | 17 3/4 | 18 1/6 | 18 3/5 | 19. | 19 3/8 | 19 3/4 |
| | | | | | | 16 | 16 1/2 | 17. | 17 3/7 | 17 7/8 | 18 1/3 | 18 7/9 | 19 1/6 | 19 5/8 | 20 | 20 2/5 |
| | | | | | | | 17 | 17 1/2 | 18. | 18 1/3 | 18 7/8 | 19 1/3 | 19 3/4 | 20 1/6 | 20 5/8 | 21 1/32 |
| | | | | | | | | 18 | 18 1/2 | 19. | 19 2/5 | 19 7/8 | 20 1/3 | 20 3/4 | 21 1/5 | 21 5/8 |
| | | | | | | | | | 19 | 19 1/2 | 20. | 20 1/7 | 20 9/10 | 21 1/3 | 21 3/4 | 22 1/4 |
| | | | | | | | | | | 20 | 20 1/2 | 21. | 21 3/7 | 21 8/9 | 22 3/8 | 22 4/5 |
| | | | | | | | | | | | 21 | 21 1/2 | 22. | 22 1/2 | 22 7/8 | 23 1/3 |
| | | | | | | | | | | | | 22 | 22 1/2 | 23. | 23 1/2 | 23 7/8 |
| | | | | | | | | | | | | | 23 | 23 1/2 | 24. | 24 1/2 |
| | | | | | | | | | | | | | | 24 | 24 1/2 | 25. |
| | | | | | | | | | | | | | | | 25 | 25 1/2 |
| | | | | | | | | | | | | | | | | 26 |

lace this Table bet



Face this Table betw



# The Table of Timber measure, with the declaration and vse of it.

## *The x. Chapter.*

THis Table (as yee see) is diuided into two Columnes or Rowes: the one very short, the other longer. In the head of the first, I haue put this word Foot: in the second row, Inches, and parts to signifie Feet, Inches, and parts of Inches. The summes in the margine and left part of the first and second columne, declare the quantitie of the square of Timber or Stone from 1. to 36. Inches square. Within the rowes you may find the iust length to a foot square, if ye enter into them in right order according to the square.

### Ensample.

SUppose the square of your Timber were 7. Inches, and that yee desired to know what measure or length of the ruler would make a Foote square: seeke in the left margine, seuen Inches: and with him in that order toward the right hand, ye shall finde 2. foote 11. Inches, and $\frac{1}{7}$ of an Inch. Note because the fraction $\frac{1}{7}$ hath a pricke by him, it betokeneth some small quantitie lesse then $\frac{1}{7}$ of an Inch. If it had two prickes or points thus: $\frac{1}{7}$ it should signifie some little quantitie more. Neither maketh it matter whether yee obserue this pricking or no, the quantitie is so little to bee added or pulled away.

Note what hath beene spoken of Timber, the same also is to bee vnderstood of stone, likewise to bee measured.

Thus is finished the measuring of Timber.
Now ensueth of boord.

# Tables, Boord, or Glaſſe.

## How Tables, Boords, Glaſſe, or any ſuch like, are meaſured, according to their length and breadth, onely to the foot ſquare.

### *The xi. Chapter.*

This thing is performed by the helpe of a large Table following, diuided in fiue ſmall Tables, and as many Margins. The firſt and left Margin beginneth at $\frac{1}{4}$. which is one quarter of an Inch, and extended to fiue Inches, as ye may plainely perceiue if ye runne downe by that Margin. This hath his Table on the right ſide adioyning vnto him. The other taketh his beginning at fiue Inches, $\frac{1}{4}$ and endeth at twelue, hauing his proper Table alſo. The third from 12. $\frac{1}{4}$ to 18. And ſo from 18. $\frac{1}{4}$ to 24: from 24 $\frac{1}{4}$ to 30. The laſt Margine is from 30. $\frac{1}{4}$ to 39. and there endeth.

Of this that is ſaid, you may gather that euery Margin hath his Table on his right ſide. Alſo you muſt know that in the top, and beneath, I haue put (as in the Table of Timber meaſure) theſe words, Foot, Inch, and parts, to ſignifie, Feete, Inches, and parts of an Inch. Whenſoeuer yee liſt to meaſure boord, Glaſſe, or any other ſuch, with the breadth of it, enter this table, and ſeeke that breath in his proper margin; there ye ſhall finde in right order how many Feet, Inches, or parts of an Inch, belong to a Foote ſquare. So often as the meaſure is in your ſtuffe, iuſt as many Feete haue ye in that Boord, or ſuch like. If the breadth exceed this table, then diuide the breadth in parts, and worke as is and ſhall be declared. So the ingenious applieth this Table for all manner breadths, moſt exactly.

Example.

| Fo | Yn | Fo | Yn | Yn Par | Yn Par | Yn Par | Yn Par |
|---|---|---|---|---|---|---|---|
| ¼ 48 | | 0 ¼ | 1 11 1/25 | 12 ¼ | 11 ¾ | 18 ¼ | 7 7/8 | 24 ¼ | 5 15/16 | 30 ¼ | 4 1/4 |
| ½ 24 | | 6 ½ | 1 10 1/2 | 12 ½ | 11 ½ | 18 ½ | 7 ¾ | 24 ½ | 5 7/8 | 30 ½ | 4 5/7 |
| ¾ 16 | | 6 ¾ | 1 9 1/3 | 12 ¾ | 11 2/7 | 18 ¾ | 7 2/3 | 24 ¾ | 5 4/5 | 30 ¾ | 4 2/3 |
| 1 12 | | 7 1 | 8 4/7 | 13 1 | 11 1/12 | 19 1 | 7 4/7 | 25 1 | 5 ¾ | 31 1 | 4 5/8 |
| 1 ¼ 9 | 7 1/5 | 7 ¼ 1 | 7 7/8 | 13 ¼ | 10 7/8 | 19 ¼ | 7 ½ | 25 ¼ | 5 2/3 | 31 ¼ | 4 5/8 |
| 1 ½ 8 | | 7 ½ 1 | 7 1/5 | 13 ½ | 10 ⅔ | 19 ½ | 7 7/8 | 25 ½ | 5 5/8 | 31 ½ | 4 4/7 |
| 1 ¾ 6 | 10 2/7 | 7 ¾ 1 | 6 4/7 | 13 ¾ | 10 ½ | 19 ¾ | 7 2/7 | 25 ¾ | 5 5/8 | 31 ¾ | 4 ½ |
| 2 6 | | 8 1 | 6 | 14 | 10 2/7 | 20 | 7 ⅓ | 26 | 5 ½ | 32 | 4 ½ |
| 2 ¼ 5 | 4 | 8 ¼ 1 | 5 3/7 | 14 ¼ | 10 ⅓ | 20 ¼ | 7 ⅜ | 26 ¼ | 5 | 32 ¼ | 4 ½ |
| 2 ½ 4 | 9 3/5 | 8 ½ 1 | 4 15/16 | 14 ½ | 9 7/8 | 20 ½ | 7 ⅓ | 26 ½ | 5 3/7 | 32 ½ | 4 3/7 |
| 2 ¾ 4 | 4 3/8 | 8 ¾ 1 | 4 ⅔ | 14 ¾ | 9 ¾ | 20 ¾ | 6 15/16 | 26 ¼ | 5 3/8 | 32 ¾ | 4 3/8 |
| 3 4 | | 9 1 | 4 | 15 | 9 5/8 | 21 | 6 6/7 | 27 | 5 ½ | 33 | 4 ⅓ |
| 3 ¼ 3 | 8 ⅓ | 9 ¼ 1 | 3 4/7 | 15 ¼ | 9 3/7 | 21 ¼ | 6 4/5 | 27 ¼ | 5 2/7 | 33 ¼ | 4 ⅓ |
| 3 ½ 3 | 5 ⅛ | 9 ½ 1 | 3 ⅐ | 15 ½ | 9 2/7 | 21 ½ | 6 5/7 | 27 ½ | 5 ⅖ | 33 ½ | 4 2/7 |
| 3 ¾ 3 | 2 2/5 | 9 ¾ 1 | 2 3/4 | 15 ¾ | 9 ⅛ | 21 ¾ | 6 5/8 | 27 ¾ | 5 ⅕ | 33 ¾ | 4 ¼ |
| 4 3 | | 10 1 | 2 2/5 | 16 | 9 | 22 | 6 ½ | 28 | 5 ⅓ | 34 | 4 ¼ |
| 4 ¼ 2 | 9 7/8 | 10 ¼ 1 | 2 1/21 | 16 ¼ | 8 6/7 | 22 ¼ | 6 ½ | 28 ¼ | 5 3/32 | 34 ¼ | 4 3/16 |
| 4 ½ 2 | 8 | 10 ½ 1 | 1 3/4 | 16 ½ | 8 ¾ | 22 ½ | 6 3/8 | 28 ½ | 5 1/16 | 34 ½ | 4 1/6 |
| 4 ¾ 2 | 6 ⅓ | 10 ¾ 1 | 1 3/8 | 16 ¾ | 8 5/8 | 22 ¾ | 6 ⅓ | 28 ¾ | 5 | 34 ¾ | 4 1/8 |
| 5 2 | 4 4/5 | 11 1 | 1 1/11 | 17 1 | 8 ½ | 23 1 | 6 ¼ | 29 1 | 5 | 35 1 | 4 1/8 |
| 5 ¼ 2 | 3 3/7 | 11 ¼ 1 | 4/5 | 17 ¼ | 8 ⅓ | 23 ¼ | 6 1/5 | 29 ¼ | 4 7/8 | 35 ¼ | 4 5/32 |
| 5 ½ 2 | 2 ⅕ | 11 ½ 1 | 1/2 | 17 ½ | 8 ⅕ | 23 ½ | 6 1/8 | 29 ½ | 4 7/8 | 35 ½ | 4 1/16 |
| 5 ¾ 2 | 1 1/23 | 11 ¾ 1 | 2/7 | 17 ¾ | 8 5/22 | 23 ¾ | 6 1/16 | 29 ¾ | 4 5/6 | 35 ¾ | 4 1/32 |
| 6 2 | | 12 1 | | 18 | 8 | 24 | 6 | 30 | 4 5/6 | 36 | 4 |
| Fo | Yn | Fo | Yn | Yn Par | Yn Par | Yn Par | Yn Par |

## Ensample.

Suppose I haue a pane of Glasse, or a Boord, whose breadth were 22. inches, $\frac{1}{4}$. the length 16. foot. In the fourth margine, I finde this breadth, 22. and $\frac{1}{4}$. And euen with it in the table rightward, I see 6. inches, $\frac{1}{4}$. So much of my Ruler wanting some small quantity, maketh a foot.

Now because in the length of my boord (which is 16. foote) that measure is found 29. times, and $\frac{2}{3}$ parts: I conclude 29. foote there to be, and two third parts of a foote Square, according to the length and breadth I said (wanting some small quantity) because of the point ioyned to this fraction $\frac{2}{3}$. which is put to diminish the fraction some little thing, as is declared plainely in the other Tables before put forth.

He that desireth to measure chamber floores, pauements, or such like, let him onely multiply the breadth with the length, so the product sheweth the Content.

## Ensample.

If there were a pauement 100. foot long, and in breadth 50. I must needs conclude by multiplication of the length in the breadth there to be contained 5000. foot.

## Or thus without Arithmeticke, when the breadth exceedeth the Table.

Diuide the breadth in parts (as is opened in the Declaration of the table of account) and worke as I haue before instructed. So for pauements all manner of wayes it serueth your turne. Of this matter to put forth tables, were superfluous tediousnesse and folly. The ingenious with these few will be satisfied.

# The Carpenters Ruler.

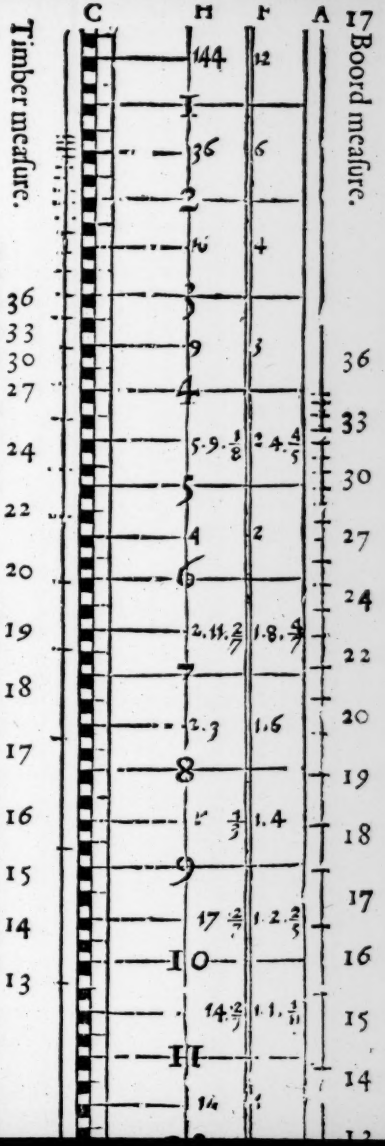
The face of the Carpenters Ruler, figured with the *true measures, and other* things necessary.

## *The xij. Chapter.*

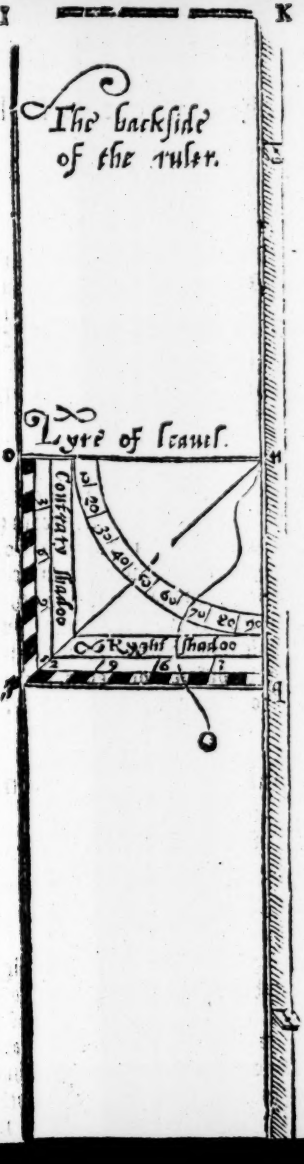
BEcause the effect of this ruler is aboue declared by tables, an instrument also well knowne & common among good Artificers, I will not spend many words in opening it. Behold the figures and learne by them how yee ought to make and commonly to decke your ruler, both with timber and boord measure.

Ensample.

Admit the Ruler to bee a. b. c. d. well plained 12. Inches long, a quarter of an Inch thick, and two Inches in breadth. Truely it were more commodious, if it had two foote in length. This ruler here imagined, but a foote in length is diuided first in 12. euen parts called inches: then euery inch in halfe or two equall portions: each halfe in two quarters: euery quarter in foure or 2. parts at the least: as in this ensample. Then are the figures placed from 1. to 12. manifesting the Inches. Thus your ruler is ready to receiue the measures which are marked or figured on your Ruler thus. Adde first the timber measure as fol-



WE shall resort to your table of Timber measure, and seeke how many feete belong to one Inch square: there yee shall finde 144. This number note, write, or rather graue, where this figure 1. representing one Inch, is figured as ye may see in the middest betweene the line c. f. and the line of the figure g. h. This done, resort to your table againe, and behold how many feete and parts two Inches square requireth. So shall yee finde 36. foote, which is placed in the next roome leftward, vnder the Character 2. signifying two Inches. Thus the rest, feete, Inches, and parts, found in your table, vntill you come to the 12. Inch, where yee shall perceiue twelue Inches onely to bee set in his proper roome, &c. Then seeke further in your table what belongeth to 13. Inches. Loe tenne Inches and $\frac{1}{7}$. This must bee numbred in the line c. d. from c. which line betokeneth the thickenesse of the Ruler. Make there a little strike vpon that grossenesse, euen or right against the measure 10. What needs many words? Thus doe vntill you come to 36. Inches, and that is noted (as the table of timber measure sheweth) right with one Inch and $\frac{1}{7}$ from c. No otherwise is performed of boord measure, as ye may behold set forth by the helpe of his proper table in the Square roomes beneath the line c. f. and also the other thicknesse or line b. a.




## The backside of the Ruler, with the quadrant Geometricall.

*The xiij. Chapter.*

The making of a Geometricall quadrant.

This other figure i.k.l.m. is the backside of your ruler, hauing in the middest of Geometricall quadrant n. o. p. q. whose making in few words is thus expressed. The line or breadth of your ruler n.o. the line o.p.p.q.q.n. ought to be of one equall iust length, cutting each other squirewise. And from the center n. vnto p. is drawne another line, which is called the line of height. So is o.n. the line of leuell. q. n. the line of heights vpright. This knowne, I open my compasse, one foot remaining. In the center n. the other extended in the line of leuell almost to o. making a circumference to q.n. which is a portion of a circle named a quadrant, and ought to be diuided into 90. equal parts, as ye may behold, euery of them called a degree. Yee may diuide the lines o.p.p.q. named the Scale each in 12. as here, or in 60 yea in 100. equal portions is more meete for the vse of shadowes, heights, lengths, &c. Note that the side or halfe Scale, o.p. is called the contrary shadow p. p. right shadow. Remember that vpon the thicknesse m. k. yee ought to haue two fine equall square sights wel bored, represented here by r.s. made of wood, or rather mettall to bee

Note these three principal lines.

The line of heights vpright.

The diuided sides o.p. and p.q. are called the Scale.

## The common vſe of the Carpenters Ruler, touching the Face afore put forth.

*The xiiij. Chapter.*

The eight Chap. ſheweth how the true ſquare is found.

SUppoſe a piece of timber to bee moaten, whoſe true ſquare is 7. Inches, this ſquare appointed you to the figure of 7. in the line g. h. vnder whom rightward in the place aſſigned to Timber meaſure is written 2. foot, 11. Inches, $\frac{1}{7}$. As often as that meaſure is found in the length of your timber, ſo many foote of timber is in that piece.

### Another Enſample.

IMagine your Square to bee 22. Inches: ſeeke in the line a. c. Note then how much of your Ruler is left from that to the end of your Rule c. and ſo much belongeth to a Foote. Therefore lay out the meaſure vpon your timber, and reckon how many times yee may finde it, from the one to the other of your Logge: for ſo many foot of timber is there. Euen thus of boord. Seeke the breadth vpon your Ruler, in the roome or place of boord meaſure, and immediately before your eyes there remaineth what is to be laid out to make a iuſt foot of boord.

## The vſe of the principall lines in the Geometricall Quadrant on the backſide of the Ruler, and firſt of the leuell line.

*The xv. Chapter.*

IT behoueth you to looke through your ſights q. n. placed in the thickeneſſe of line k. m. a fine thred and plummet falling at liberty out of the Center n. If this plummet and thred chaunce preciſely on the line of leuell (which is n. o. whatſoeuer ye ſee through the ſights, is leuell with your eye, if otherwiſe

wiſe the thing that yee looke vnto is not leuell, either moze oz leſſe then the height oz leuell of your eye: Moze, if the Plummet fall to you ward: leſſe, if contrary.

## How by the line of Leuell to forſee whether the water of any Spring or head is poſſible to bee brought to a place appointed, and alſo to iudge the wholeſomneſſe of it.

*The xvi. Chapter.*

WE ſhall goe to the head oz Spring, and ſet your Ruler to your eye (being in height equall with the water) ſo that the fine cozd and Plummet fall pzecilely in the line of leuell. Now if thzough the ſights ye may ſee aboue the place, know and iudge the water poſſible to be bzought: if your ſight fall vnder, impoſſible. It commeth commonly to paſſe, when the place to the which yee would haue water conueyed, is of any great diſtance from the head, then Hilles, Valleyes, and ſuch like impediments, let the line viſuall to haue his free courſe: wherefoze this remedie is pzouided. At the head of the ſpring, ye ſhall looke thozow the ſights (as before) and note a marke in the next Hill toward the place, then goe to the marke in like manner obſerue another in ſome hill: ſo forth vntill by any of them yee may perceiue the place deſired. If then your ſight running thzough the pinnes of your Ruler (the thred euer falling on the Line n.o.) excede that place, the conueying of your water is poſſible. Otherwiſe not.

Now by the way bzicfly yee ſhall bee inſtructed how yee may know the wholſomneſſe of water.

## How good water is knowne.

TAke a cleane pot, and put water in it: ſo ſet it on the fire: after a little boyling, powze it out, if then no filth re-

maine in the bottome of the pot, it may bee iudged the wholeſomer. Or thus. Let fall drops vpon metall, or rather on Glaſſ (any of them being poliſhed) and ſuffer that to drie by it ſelfe: if after there remaine no ſpot or ſigne, it is a good token. Moreouer, if your water bee ſweete, pure, cleare, light, or of little weight, it followeth the water to bee wholeſome for the vſe of man.

## Of the Line of height.

WHenſoeuer the Thred and Plummet doe chaunce iuſtly on the Height, which is n. p. the Altitude or Height that yee ſee is euen with the diſtance from the middle of your Foote, to the nether part directly vnder the toppe, equall with your ſtanding, adding the Height of your Eye downeward. Know that yee muſt euer ſtand vpright with Bodie and Necke, your Feete iuſt together, the one Eye cloſed, &c.

## The line of vpright Altitudes.

IUdge alſo any thing plumbe vpright when the thickneſſe of your Ruler i. l. is cloſely thereon, the plummet then at Liberty falling on q. n. named the Line of heights vpright. Now followeth the vſe of the Scale.

## To ſearch out Heights by the Scale with the aide of two places.

*The xviij. Chapter.*

LEt the Thred and Plummet fall in the one, on the 12. points: in the other Station, on the 6. of the right ſhaddow: double the diſtance betweene the two places, the ſummitie appeareth from that part of the thing meaſured, which is equall in Height with your eye.

eye. Or the one in the 12. the other in 8. of right ſhadow: then triple the diſtance. The one in 12. the other in 6. of right Quadruplate, the ſpace. The one in the 12. the other in 6. of the contrary ſhadow, then the ſpace betweene both the Stations is equall with that yee meaſure, euer vnderſtanding from your eye vpward. Euen that ſame commeth to paſſe, if in the one the Threed bee found vpon the 6. of the contrarie, in the other on the 4. of the ſame, or the 4. and 3. of the contrarie. In all theſe the ſpaces are equall with the Altitudes. So then in meaſuring the diſtance betweene the two places, yee haue the height from your eye vpward, putting to it the length from your ſight downeward, the whole Altitude appeareth: the Baſe being equall with your ſtanding.

I would not haue your ignorant here how to know lengths which be in height not eaſie to come vnto. For (as before) get the height of the toppe, the Altitude of the Baſe or longeſt part of your length. Subduct the leſſe height out of the more, of force your deſired length remaineth. Or thus: Let the plummet and threed fall in the 12. Marke your place: goe in toward the thing (the threed as it was) vntill yee ſee the Baſe of that length: the diſtance betweene the two ſtandings, is vndoubtedly the Length. How lengths in height are knowne.

## How with Scale direct or vpright heights by their ſhadowes are declared.

*The xix. Chapter.*

TVrne your left ſide vnto the Sunne, ſuffering his Beames to pearce both your ſights q. r. placed (as afore is ſaid) in the thickeneſſe of line k. m. The Threed or Plummet then hanging at libertie, out of the Center n. ſheweth as well the Degrees

of height to bee counted from o, as the parts of the Scale cut. If your thzed bee found in the 12. part or line of leuell, shadowes of all things being perpendicular eleuated, are equall with their bodies. If the plummet with the thzed bee perceiued, cutting the parts next to the sights, which I name points of the right shadow, then euery thing direct is moze then his shadow, by that pzopoztion which 12. exceedeth the parts, where the thzed was found. If it fall in 1. that is the first part of the right shadow, take the shadow twelue times, to make the height. In two, that is the second part, fiue times, in the third, foure times: in the fourth, three times: in the fift, twice: and $\frac{2}{3}$. of the shadow, in the sixt twice, in the seuenth once, and $\frac{1}{2}$. in the eight once, and $\frac{1}{2}$: in the ninth once, and $\frac{1}{3}$: in the tenth once, and $\frac{1}{8}$: in the eleuenth ye shall take the shadow once, and $\frac{1}{11}$. part of it.

Right shadow. If the Art of numbzing were had, I would will you to multiply the length of the shadow by 12. and the pzoduct diuide by the parts, in the which ye found the thzed.

Contrary shadow. But if it bee in the parts of the contrary shadow, augment the length of the shadow with the parts declared by the plummet: and the increase diuide them by 12. so commeth the Altitude also.

Thus the composition and whole appliance of the Carpenters Ruler is shewed: therefoze somewhat shall be now said of the Squire.

I am not ignozant that the common vse of him, is better knowne than I can with many wozds expzesse, wherefoze I leaue to wzite in that behalfe. Notwithstanding I will declare how Heights and Lengths are taken, &c. matters rare and knowne of few Artificers.

Also by Tables to get a true knowledge of the day houre, and that diuerse wayes, with the helpe of the Squire, as is opened in my generall Pzognostication, augmented in the yeere of our Lozd 1556.

## What length the ſides of thy Squire ought to bee, and the diuiſion of him.

*The xx. Chapter.*

I Neede not to put foorth the exact making of this Inſtrument ſo well knowne. Lo therefore the figure. One ſide ſuppoſed two foote from the inward Angle: and the other a iuſt foote from the ſame. The longer a. b. inwardly diuided from the Angle a. vnto b. into 24. equall principall parts, and euery of them into a leſſe (if ye liſt) each containing 10. minutes, alſo the ſide c. d. in the outward contrary, plaine from the top c. vnto d. is diuided into 12. euen portions: and againe (if yee require exactneſſe) euery of them into 6. each of value 10. minutes: Behold a line and plummet falling from e. to f. a Parallell to c. d. and a. b. Thus this ſquire is well framed for the vſe of diuers Tables put forth in my generall Prognoſtication, and alſo for the finding of Altitudes and Longitudes, which here I purpoſe now briefly to open.

## How by the Squire heights are knowne.

ALtitudes or heights are found, the line or plummet centred in the ſixt point, cutting h. the middle of a. g. The

moueable ſights placed in a. g. or a paralell from that line not vnlike, as is opened of the line of height, in the backe of my Ruler.

## How Lengths in plaine Ground are ſearched by the Carpenters or Maſons Squire.

### *The xxi. Chapter.*

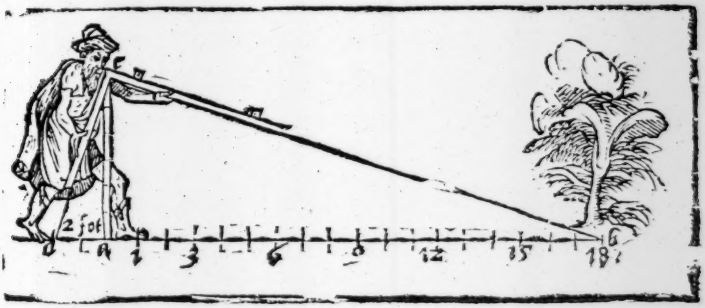
TAke a ſtaffe diuided into certaine portions as yee liſt, in a 100. or a 1000. parts. At the beginning of your length, vpon the very toppe directly ſtanding, ſet the inward Angle of the Squire: lift vp or put downe this inſtrument, vntill you ſee the furtheſt part of your Longitude, I meane vntill your ſight running from that Angle, to the end of your Squire, come vnto the furtheſt part of that length. The Squire ſo remaining, and the Staffe not remooued from his height. Marke where the other end of the Squire next vnto you noted vpon the ground. See what proportion the Staffe then beareth to the part of the ground, which the neereſt end of the Squire pointed vnto from the Staffe: the ſame ſhall the Length haue to the quantitie of the ſame Staffe.

### Enſample.

The cauſe is taken out of Euclid. 33. pro. 1. Booke and the 4. pro. 6. booke.

THe Staffe a. c. in this figure is imagined 6. Foot, and the ſpace a. d. 2. Foot. Conſidering now that 6. the length of the Staffe containeth 2. thrice, therefore the Longitude deſired, a. b. of force muſt containe three times the Staffe (which Staffe is 6. Foote) that maketh 18. Foote. As this is prooued true by a ſmall ground in the figure following: ſo the Art faileth not in a greater ſpace, which the good Speculator

Speculator and diligent Practiſer by any way cannot denie. Yet experience willeth me this to confeſſe, that the Squire is not conuenient for any long diſtance, but the Inſtrument Geometricall (whoſe making and vſe yee may perceiue in the Treatiſe following) vnleſſe yee aſcend ſome Tree or Turret for your ayde, which length knowne, ſhall ſtand in ſtead of your Staffe.




## A Note.

IT behoueth you to haue a fine cord, made faſt in the vpper part of your Staffe. c. which ſhall bee tyed euen with the inward edge of the Squire, and ſo drawne to the ground, where the neere end of the Squire from the Staffe pointed, as ye ſee, d. c. the other end then truly directing to the furtheſt diſtance.

Know that the ground muſt be very plaine and leuell, otherwiſe error enſueth.

Thus the vſe of the Squire is heere ſomewhat declared, but more in my generall Prognoſtication, yea moſt plentifully hereafter (God ſparing life) in a Booke titled, The rare vſe of the Squire in practiſes Mathematicall. In the which Booke profitable pleaſant experiences ſhall bee plainely opened (onely of me practiſed) as well of Perſpectiue, as of the Mathematicals in generall.

# A little Treatiſe, declaring the making and vſe of an Inſtrument Geometricall, ſo farre as it furthereth the Landmeater or Carpenter, named the profitable Staffe.

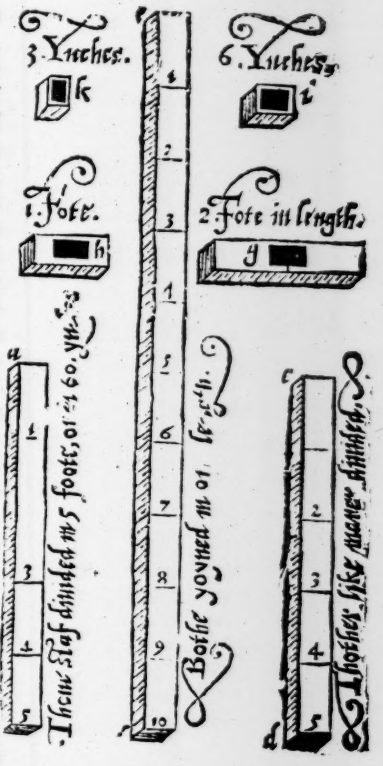
## *To the Reader.*

I Said in the beginning, that no little Booke would containe the making and manifold fruites of this princely Inſtrument, if it were ſet forth as it ought to bee in his perfection. Certes the trueth euen here maketh me confeſſe the ſame: yea that there is no Inſtrument ſo generall and profitably pleaſant: Notwithſtanding know (gentle Reader) that the occaſion of his chiefe vſe and profit is not heere miniſtred: neither, to ſay the trueth, doth it appertaine to, or agree with the capacitie of ſuch Artificers. Therefore I ſhall leaue to intreate of his ample large vſe and beſt making, and will ſet him forth in few words: yea ſufficiently for the Land-meaters capacitie or Carpenters purpoſe, that at the leaſt, they may receiue ſome kinde of fruite with the Geometrer. And in time to come (by other meanes) as I ſee cauſe, I will largely declare, and there decke him with his proper beauties. Here now followeth the making, and ſo briefly, how he is applied for the profit of the aforenamed Artificers.

The

## The making of this profitable Rodde or Staffe.

YE ſhall prepare two ſmall, ſtreight, ſtiffe, round, or rather ſquare rods of mettall or of wood, well plained of like bignelle and length. Although it make no matter of what length, yet to auoide the errours, which little inſtruments, and ſhort ſtaues bring, and alſo to beare with the rude vnwonted handling of ſuch Artificers: let our Rods bee each fiue, or at the leaſt three foote, and euery foote diuided in 12. euen parts or Inches, as yee ſee a. b. and c. d. Theſe Rods muſt bee forged with a boyce in the end of them to ioyne readily tenne or fiue foote in length. (when time requireth) as the figure e. f. ſheweth. Alſo yee muſt get (by the helpe of ſome Craftſman) foure other like Rods, the longer g. 2. Foote: the next h. 1. Foote: the other i. 6. Inches, then k. 3. Inches, the laſt and ſhorteſt l. 1. Inch, and ½. Each of theſe muſt haue in their middeſt a hole, that the long ſtaffe of ten foote may bee put through them, and they moued on him at pleaſure vp and downe, alwayes cutting the longer ſtaffe e. f. Squirewiſe, and made to tarry on any diuiſion, as



as occaſion ſhall be giuen: which all are eaſily to bee perceiued by the figure following, although my rude declaration hath not expreſſed my meaning.

Here note in the ſtead of your ſhort ſtaues, yee may haue one croſſe ſtaffe two foote long, with currant ſights, ſo artificially made, that alwayes the ſhort ſtaffe ſhall runne ſquire vpon the longer, and the ſights diſtant, as ye liſt to place them.

## Things needfull to be knowne before the vſe of this Inſtrument is opened.

*The ij. Chapter.*

BEfore I intreate of this vſe, it behoueth to know things neceſſary, and firſt which of the fiue little ſtaues g.h.i.k.l. mentioned in the making is to bee put vpon your long ſtaffe e.f. according to the diſtance of the marke. Note if your marke be neere hand, be it length, breadth, or heigth, the longer g. doth ſeeme meeteſt to haue the roome, if more of length, the other h. and ſo the further diſtance, the ſhorter the ſtaffe requireth to be, which ſhall occupie that place. Oft practiſe ſheweth this better than many words. Alſo note, if chance bee to goe in toward your marke, (as after ye ſhall ſee how) you muſt remoue the ſhort ſtaffe inward more neere to the end of the longer e. If ye bee compelled to goe from it, then put it from e. toward the end f. Alſo remember when ye are appointed to meaſure any breadth or length (as ſhall be declared) it behoueth you to ſtand right with, and againſt that breadth: yea, and the longer the breadth or larger the wideneſſe or length is, the better the thing will come to paſſe. And for heights it is neceſſary (if yee regard all preciſeneſſe) to haue the height ſtand directly vp.

## Note this that followeth to be generall in all workings.

YE muſt ſtand right vp with your Bodie and Necke, your feete iuſt together, your hands not much mouing, the one

eye

eye closed, and euer marke your standing right with the midst of your feete. Bee not ignorant here, that I call the extremes of the little staues, the very ends where the sight euer runneth. And no difference betweene the Altitude and height, betweene the Longitude and length: the Latitude and breadth. The short staues I name by the letter figured ouer them. Your eye must euer bee placed in the end of the longer staffe c. and with the other eye ye ought to winke.

What these words meane, Longitude, Latitude, Altitude

These trifles and such like omitted, letteth the trueth to come to passe, and make men to suspect the Ground, which is most certaine.

## How heights standing directly vp, are measured by the instrument.

*The iij. Chapter.*

PVt the staffe g. vpon the longer c.f. and moue him his iust length from the beginning of the longer c. turne the ends of g. toward you, and according to that height placing your eye (as is said) euer at the beginning of the longer c. with the other eye winke. Then go backe vntill ye may plainly perceiue the very vpper part of that Altitude, and also the lower end by the extremes of your shorter staffe g. Now the space of the middle of your foote to the base of the height is equall with the Altitude.

### Or thus.

When ye shall see any Altitude, whose measure yee require, imagine by coniecture how oftentimes that height is found in the space from it vnto your standing. Then moone your shorter staffe (chosen as aboue most conuenient) euen as often his owne length from the beginning of the longer c.

where your eye is euer placed. This done, turne the ends of your little ſtaffe, your eye being in e. according to the height: looke whether yee may ſee by the extremes of your ſhorter the very top, and alſo the loweſt part of the height. If not, moue the ſhorter a length further toward f. or neere to e. as yee ſee cauſe, and as your coniecture failed. Or let your little ſtaffe remaine, as by coniecture hee was put, and goe toward or from that height, vntill the Altitude agree iuſtly with the extremes of your ſhort ſtaffe. Then marke that place with the middeſt of your foote.

Now ye may conclude, that the height is as often contained in the diſtance, which is betweene the marke and it, as the length of that little ſtaffe is found remooued from the end of the longer, &c.

## Enſample.

How the iuſt height is knowne.

If the ſhort ſtaffe bee tenne times his owne length from e. affirme the height contained in that diſtance ten times only.

The Altitude is thus gotten. Mooue your ſhort ſtaffe from his late being a length either toward or from e. as yee liſt to goe in or backe. Then goe fro or neere vnto it (as before) vntill the very ſummitie, and alſo the loweſt part of the height agree with the extremes of your ſhorter ſtaffe. The ſpace then betweene your marked place and this latter, declareth the iuſt height. Oftentimes through impediments, yee ſhall not haue roome to goe ſo farre backe or forward, as the height commeth vnto. This remedie is prouided. Mooue the little ſtaffe halfe his length, and ſo ſeeke two ſtations (as before) vntill the extreme of the ſhorter ſtaffe bee found iuſtly to anſwere either end of the height. Then the ſpace betweene the two ſtandings muſt bee doubled to haue the iuſt height: or if ye liſt, yee may moue the ſhorter, according to the fourth part of his length, or to any portion, as to the fift, ſixt, twenty, &c. then ſhall yee haue that part of the height betweene the two ſtations.

A remedy prouided for want of ground.

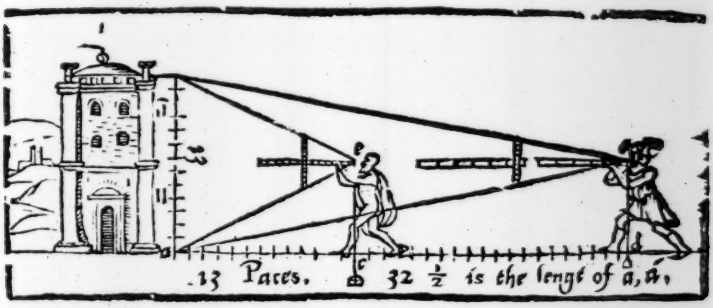
Yee

Yet know this (which experience by diligent practise will shew) the bigger parts yee take, the lesse errour ye commit. A little error often multiplied, encreaseth to a great.

Now that all the aforespoken may the better bee perceiued, behold the example ensuing, as yee may see by figure declared, in the which the height is imagined a.b. the first station c. the short staffe g. is moued from e. till his length. I am forced to conclude, that the Base of the height a.b. is from my standing c. euen his precise length. So then if you measure that distance of a.c. being 13. paces, yee haue the true height of a.b. as many. In the other standing place e. the shortest staffe is found from e. twice his length and a halfe, wherefore I must affirme the height a.b. to be contained or found in the distance a.d. twice and a halfe: which length a.d. is apparent 32. paces. All this that is spoken of the height, may well bee vnderstood of Latitudes or widenesses, and lengths following.

The ground of this may be gathered of Euclide in his perspectiue, 21. Theo.

In Altitudes this rule is not perfect, except the eye be leuell with the middle of the Altitude.



## How the breadth or wideneſſe of things are found, and by them, Length or any diſtance at pleaſure.

*The iiij. Chapter.*

Whatſoeuer I haue inſtructed afore of heights, the ſame vnderſtand here of wideneſſe, lengths, &c. For none otherwiſe are Latitudes or wideneſſes ſearched by this Inſtrument, then before is declared of heights, onely this excepted, that the ſhort ſtaffe muſt lie contrary, the ends according to the breadth, ſeeing by the extremes of the ſhort ſtaffe, the very vttermoſt parts or ends of the Latitude, noting your ſtations right with the muſt of your foote. And ſo performe all as afore. And as I ſaid, thereof the parts of the height found betweene your ſtandings, euen the ſame things is well vſed here, for all manner parts of the breadth.

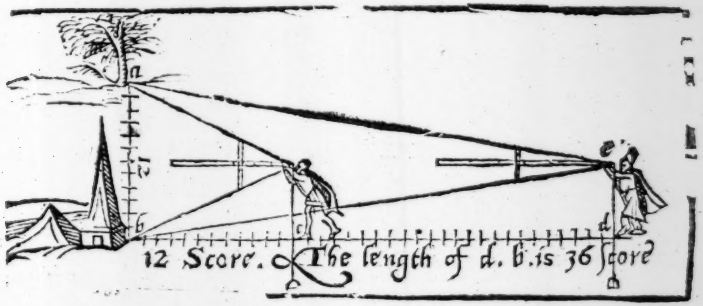
### Enſample.

The breadth in this figure following ſuppoſed a. b. Alſo the firſt ſtation c. the next d. My deſire is to know the wideneſſe a. b. and the length or diſtance d. b. Marke how the ends of the leſſer ſtaues are turned to the extremes of the wideneſſe. Then behold how the ſhort ſtaffe in c. is but once his length remooued from e. Wherefore (by the inſtructions of heights afore) ye may boldly ſay, that the wideneſſe a. b. is but once contained betweene d. and b. and that meaſure is found 12. ſcore, as much as is the other a. b. In the ſecond ſtanding d. the little ſtaffe is remooued three times his length from e. For that cauſe I conclude (and truely) from b. to that ſtation three times the breadth, which breadth is 12. ſcore. So by the wideneſſe I haue found the length of b. d. 36. ſcore, my deſire. Thus are Latitudes found, and by them lengths, &c.

Behold

## Behold the figure.

Ye muſt alwayes ſtand directly againſt the middle of the Breadth.




Whenſoeuer any diſtance is put, whoſe certaine length yee require: meaſure (by the art expreſſed) either the height of any thing there found, or the breadth, and ſee how oftentimes that wideneſſe or length is contained vnto your ſtanding: which knowne, the length cannot be hid, as is declared.

NOw in few words to conclude, yee may by this Inſtrument meaſure the diſtance of Houſes, Steeples, Trees, the length of Valleys, the breadth of Ditches, Images in height, and ſuch like. The good wittie Carpenter ſtanding in a place, where hee may plainely ſee a whole houſe, or any manner frame with great pleaſure, may by this get ſpeedily the true proportion of that houſe, which hee ought to note in a Table, and when time commeth (not without his great praiſe) may make, reare and ſet vp the like. This I take to be ſufficient for theſe Craftſmen.

A more larger vſe of this Inſtrument.

I haue

How the length of land is exactly found.

I Haue before forgotten to admonish you whensoeuer yee list to measure any land exactly, by the Instrument Geometricall, named the profitable Staffe, to set vpright a Rodde, the length of a Pearch. Or if the distance be long, to passe out, or rather iustly mete fiue or moe Pearches, at the end or head of your length, the extremes noted with two visible markes. Then goe from thence, and seeke the lengths by that certaine widenesse, as is declared: so shall yee not faile to bring very true land. Note that a little errour found on the breadth, oft multiplied, encreaseth to a great, yea, to an intollerable fault in the length, therefore the breadth or widenesse ought truely to be searched. This I take sufficient for these Craftsmen.

I would desire where my grosse writings seeme to bee obscure, that I were present the Instructer: for truely a liuely voyce of a meane speculator somewhat practised, furthereth tenne fold more in my iudgement, than the finest writer.

Farewell. Accept my good will, and looke shortly (if God spare life) for a profitable encrease of these matters.

FINIS.

the surveyor Boolem

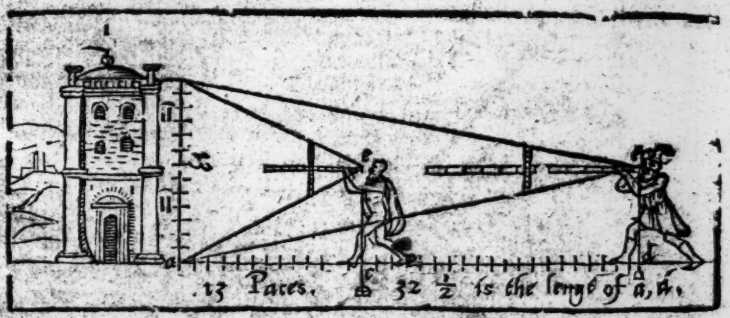
A

# BOOKE NAMED TECTONICON,

Briefly ſhewing the exact meaſuring, and ſpeedie reckoning all manner of Land, Squares, Timber, Stone, Steeples, *Pillers, Globes, &c. Further declaring the perfect making and large vſe* of the Carpenters Ruler, containing a Quadrant Geometricall: *comprehending alſo the rare vſe of the Squire. And in the end a little* Treatiſe adioyning, opening the compoſition and appliancy of an Inſtrument called the Profitable Staffe. With other things *pleaſant and neceſſary, moſt conducible for* Surueyers, Land-meaters, Ioyners, Carpenters and Maſons.

( 13 )

*Publiſhed by* LEONARD DIGGES *Gentleman, in the yeere of our Lord,* 1556.




LONDON,
Imprinted by *Felix Kyngſton*,
1634.

1596. 16

# L.D. To the Reader.

ALthough (gentle Reader) many excellent in Geometry, vpon infallible grounds, haue put forth diuers moſt certaine and ſufficient Rules, touching the meaſuring of all manner Superficies: yet in that the Art of numbring hath beene required, yea chiefly thoſe Rules hid, and as it were locked vp in ſtrange Tongues, they doe profit (or haue furthered) very little the moſt part: Certes nothing at all, the Land-meater, Carpenter, Maſon, wanting the aforeſaid. For their ſakes I am here prouoked not to hide, but to open, and ſo encreaſe the Talent which I haue receiued: yea, to publiſh in this our Tongue very ſhortly (if God giue life) a volumne containing the flowers of the Sciences Mathematicall, largely applied to our outward practiſe, profitably pleaſant to all manner men in this Realme. In the meane time I ſhall deſire the Artificers aboue named, to bee contented with this little Booke (a taſte of my good will towards them) which I wiſh euen ſo to further the Readers, as I know it ſufficient for the true meaſuring and ready account of all manner Land, Timber, Stone, Boord, Glaſſe, Paument, &c.

Here mine aduice ſhall bee to theſe Artificers that will profit in this, or any of my bookes now publiſhed, or that hereafter ſhall be, firſt confuſely to reade them thorow, then with more iudgement. Reade at the third reading, wittily to practiſe: So few things ſhall be vnknowne. Note, oft diligent reading, ioyned with ingenious practiſe, cauſeth profitable labour.

*Thus moſt heartily farewell (louing Reader) to whom I wiſh my ſelfe preſent, to further my deſire and practice in theſe.*

# THE PLEASANT PROFIT OR content of this little Booke, and in what it *exceedeth all other published.*

OTher Bookes tofore put forth in our Engliſh tongue, contained onely the bare meaſuring of Land, Timber, and Boord: how agreeable in all places to the rules of Geometrie, let the learned iudge. Here (gentle Reader) thou ſhalt plainely perceiue through diligent reading, how to meaſure truely, and very ſpeedily all manner of Land, Timber, Stone, Steeples, Pillers, Globes, Boord, Glaſſe, Pauement, &c. without any trouble: not painted with many rules, or obſcure termes, nor yet with the multitude of Tables, as heretofore hath bin: in which not a few errours were committed: for that cauſe no iuſt account might any way bee had. Further, ye ſhall by this Booke vnderſtand the whole making and comely handling of the Carpenters Ruler, with the true meaſure, &c. And his vſe appointed to the ready meaſuring of all kinde of Timber, Stone, Boord, &c. Alſo the leuelling of grounds, and taking of heights, is pleaſantly and diuerſly practiſed by the Ruler. Yee haue here not the common, but the rare vſe of the Square, applied to heights, lengths, &c. And to the finding of the iuſt houre of the day diuers wayes, through the aide of pleaſant Tables newly adioyned to my generall Prognoſtication: by the which the proportion of things, direct or ſquire-wiſe ſtanding, are by their ſhadowes knowne.

To conclude, in the end of this Booke is added a Treatiſe, ſhewing the making, and vſe of an Inſtrument, by which yee ſhall get lengths, heights, breadths, wideneſſes, where or howſoeuer they ſtand. Other neceſſary things are contained in this little volume, which I commit to the diligent Reader.

# DIVERS THINGS
## CONDVCIBLE TO THE ART OF MEASVRING.

### *The first Chapter.*

AS there are few Craftsmen which haue all the kindes of Arithmetike readily: so I doe suppose none so ignorant, but that they doe or may easily perceiue the simple significations of these Characters or figures, 1.2.3.4.5.6.7.8.9.10. And also their strength in the first, second, and third rowmes placed. Characters numerall.

Besides that, they must bee familiar with these and such like fractions.

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{7}$ $\frac{1}{16}$ $\frac{1}{32}$ $\frac{3}{4}$ $\frac{4}{5}$ $\frac{9}{10}$. The first leftward betokeneth one second part of an whole, bee it Pearch, Inch, or any other measure: the next, one third, then one seuenth part: the other ensuing one sixteenth. So one thirty and two parts of an Inch. Then follow three fourths: foure fifths. The last is nine tenths of an Inch: that is, nine parts of an Inch, diuided into tenne portions. Fractions.

These I doe intend to put in my Examples, and in my Tables and margines following, to represent parts of Pearches or Inches. As if I would write halfe an Inch, after

this maner ¼. Three quarters of an inch thus ¾. One eight of a Pearch, on this wise ⅛. So of the rest.

It is requisite also heere to open what a Pearch, a Day worke, a Roode, and an Acre is.

Although there are diuers opinions engendred through long custome in many places, of the length of a Pearch (vpon which our chiefe matter dependeth) yet there is but one true Pearch by Statute appointed to measure by. Wherin is ordained three Barly cornes dry and round, to make an Inch: twelue inches, a Foot: three Foote a Yard: fiue Yards, ½. a Pearch: fortie Pearches in length, and foure in breadth, an Acre. So an Acre by statute ought to containe 160. Pearches; the halfe Acre 80. Pearches; a Roode, commonly called a quarter, 40. Pearches, a Day worke 4. Pearches. Loe heere the Acre expressed with his length and breadth.

Acre.

| Breadth. | Length. |
|---|---|
| 1 | 160 |
| 2 | 80 |
| 4 | 40 |
| 5 | 32 |
| 8 | 20 |
| 10 | 16 |

Instruments to measure with Poales, Cord knotted, Profitable staffe.

I must not omit heere to tell you what thing is meetest to measure Land with. They vse commonly in the countrey two Poales, either of them the length of a Pearch. They are very good: yet for all kinde of Land, a Cord fiue Pearches in length, well seared with ware and rosen, knotted or marked at the end of euery Pearch, is more meete and readier. But in my fantasie, the instrument Geometricall, which is put forth in the end of this Booke, passeth them all and other, for the exact truth and quickest speed. This Instrument is so generall and auaileable to so sundry things, that it alone requireth a large Booke, if it should be sufficiently set forth.

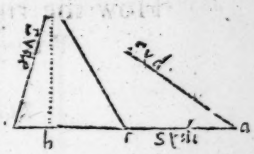
Triangle.

Also I would not haue you ignorant what piece of Land is called a Triangle, which often shall hereafter bee named. It is such a fashioned piece as hath (or is imagined to haue) three sides, and three Angles onely: whether the sides bee equall or otherwise, as this figure sheweth. Againe, note that a line is said to fall Squirewise, when it cutteth any thing, or any of a Triangle full crosse, like vnto a Squire: As the hanging

Line falling Squirewise.

pricked

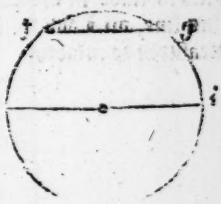
pricked line a. b. in c. d. the base line of the Triangle. Let it cutteth the side squirewise, or full crosse in the point b. and not as the other line a. c. doth. The base of any Triangle is here called that side, which is cut squirewise of the hanging line.




Base line.

Concerning a Circle, know, that the compasse of any Circle is named a Circumference: the middle point in him, his Center: the right line h.i. that goeth ouerthwart that Center touching the Circumference on both sides is his Diameter: the halfe of that line, the Semidiameter. Also an Arch is a piece of the Circumference cut away: as yee see the Arch aboue the line f.g. Also f.g.h.i. in this Circle are named paralels: for that they differ equally in all places, the one from the other.

Circle.
Circumferéce.
Center.




Diameter.
Semidiameter.

Arch.

Paralels.

Note because practise and experience sheweth me, that there is almost no Land, but it may easily be brought by imagination to a Triangle or Triangles, and so most truly measured: therefore, to be short, this order shall bee taken: I will first figure and set afore your eyes Triangled Land, and other which by imaginations shall bee brought into Triangles. Then I shall teach the true measuring of them: I meane, how to finde a length and breadth, with which yee shall enter the table of account following, where the Acres and odde Pearches (if there bee any) shall appeare. As these figures are measured, so all Triangled Land, and other brought into Triangles, of what fashion so euer they be, shall be measured. And because it is requisite for true measuring of all Triangles, to finde a straight hanging line, I shall shew first how that line is to bee found, imagined, or drawne.

How

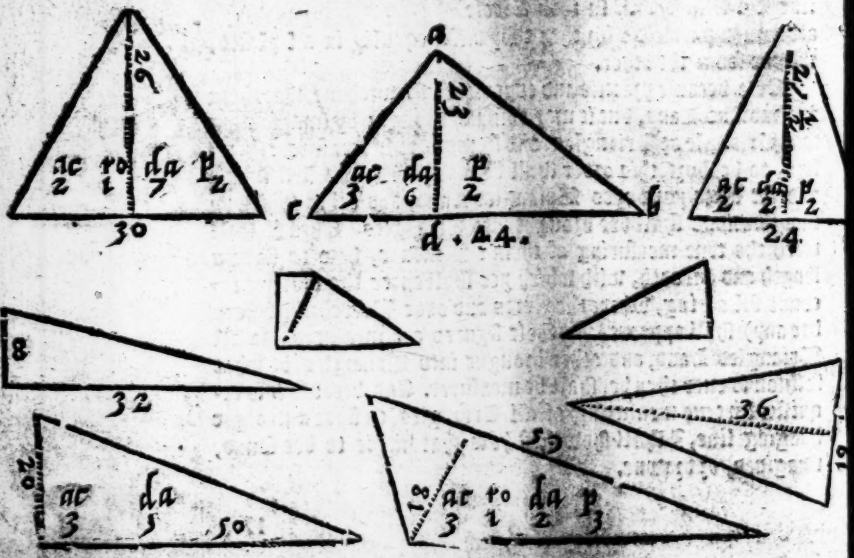
# The Art of

## How the right hanging line in Triangles is drawne.

*The ij. Chapter.*

To draw a hanging or plumbe line.

THis straight hanging line in all Triangles is euer drawne or imagined from any Angle, cutting some one side of that Triangle squirewise: as yee may perceiue the pricked lines in the Triangles following. By the helpe of this line, all Lands of Triangle fashion, are brought to bee measured as ensueth.




How

## How to measure all manner Triangled Land.

### *The iij. Chapter.*

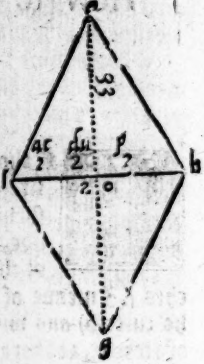
IF thou bee an Arithmetician, multiply this streight hanging line, drawne, as aboue is shewed, in halfe the number of Pearches of that side, which it cutteth Squirewise. For want of the knowledge, take the aforenamed Pearches (I meane of the hanging line, and halfe the side which he cutteth) and with that length and breadth enter your table of account, as there is set forth. So shall ye perceiue the number of Acres, Roods, Dayworkes, &c. Euclid. the 1. Booke 41. pro.

### Example.

FOr the perfect measuring of Triangles afore figured, and all other, suppose the second of these last nine figures of the other side, hauing written aboue it a. b. c. d. to bee a peece of land, whereof I would haue the true measure, I finde by a Corde, otherwise, the pricked hanging line a. b. to bee 23. Pearches: the side b. c. which it cutteth squirewise 44. Pearches, whose halfe is 22. With these 22. and 23. the conuenient length and breadth, I enter the table of account. There I finde by that Table at the corner where both the lines of conuenient length and breadth doe meete 3. Acres, 6. day workes, and two pearches to be in that Triangle. Thus of all be fore figured.

Here note your Table must euer bee entred with all the Pearches of the hanging line, and with halfe the side that bee cutteth squirewise. Or with the halfe hanging line, and the whole side cut. This Table followeth.

## A figure of a double Triangle.

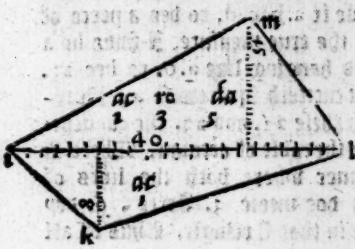


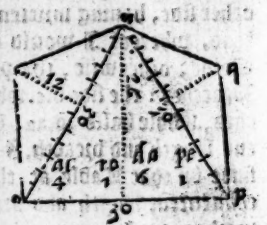

This figure e.f. g.h. is but two Triangles: and therefore measured as aboue in two parts. Or thus: The hanging line e. g. is 33. Pearches: the side f.h. that bee cutteth squirewise 20. Pearches, the halfe of the which is 10. Now enter your Table as afore, with 33. and 10. the conuenient length and breadth. So shall yee finde two Acres, two Dayworkes, and two Pearches, the true content of this figure e.f.g.h.

### Another example.

Figures of many Angles.

Admit i.k.l.m. land to be measured. Because it is no maner Triangle, it must be brought by imagination, as I haue said, into a Triangle or Triangles. Which imagination is heere signified by the line dashed i.l. Then as aboue is



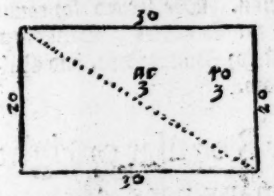

declared, it ought to bee measured (according to the rule of Triangles) in two parts, because there are two Triangles in that land. So by proofe ye shall find in the vpper i.m.l. one Acre, 3. Roodes, and fiue Dayworkes: in the other i.k.l. one Acre. Thus I gather the whole content of that Land, to bee two Acres, three Roodes, and fiue Dayworkes.

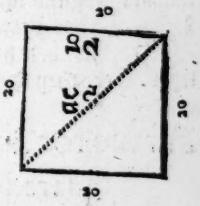
None

None otherwise of the adioyned n.o.p.q. and all other figures following: and other whatsoeuer they are, that by any meanes may be brought into Triangles.

Furthermore know that the figure i. k. l. m. is readily thus measured. Adde the Pearches of both the hanging Lines together: so haue yee 23. With this number, and with halfe the Pearches of the side, i.l. which he cutteth squirewise, being 10. Pearches, enter your Table. So is found as afore.

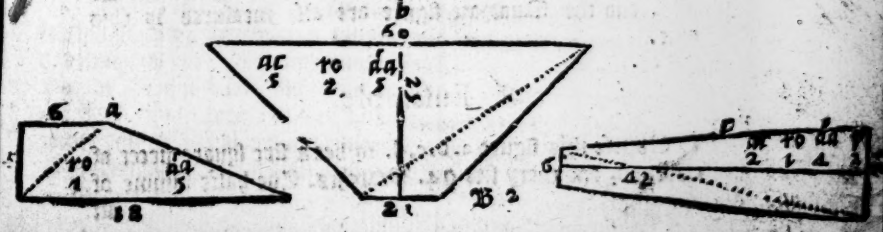
These two figures following may also bee thus measured, otherwise then by the rule of Triangles. Enter your Table with their conuenient length and breadth. So shall you finde the contents of all such.




These three figures following, although they may be measured by the rule of Triangles, yet for quicker speede, they haue also their proper measuring as ensueth.

Lay together the two sides which are paralels of the first figure a. that is 6. & 18. making 24. the halfe is 12. the breadth 5. Enter with 5. and 12. your table. So haue you one roode, and fiue day workes. For the other two b.c. and such like, ioyne the heads or ends in one: and enter your table with halfe of those Pearches, and with the whole number of the middle line.



## How by ſupputation to meaſure all triangled land.

To meaſure triangled land by ſupputation.

IOyne all the ſides together: take halfe out of that halfe, pull euery ſide, noting the difference. Then multiply the differences, the one in the other, and the third difference augment in the product. That which encreaſeth, multiply in the halfe of all the ſides ioyned. Then the Radix of the ſurmounting ſumme is the content of that Triangle.

Foure rules following.

Now reſt foure Rules to bee treated of. The firſt for all manner Regular ſquare Superficies. The ſecond for round Land, and her parts. The third for Steeples, Columnes, Globes, and their parts. The laſt for Mountaines, and Valleyes. Here they ſhall in order follow.

## A rule for all manner Regular or right ſquared Land of many ſides, as 5.6.7.8.9.10.20.100.&c.

*The iiij. Chapter.*

To meaſure land of many ſides.

MEaſure and lay all the ſides together, taking the halfe number of Pearches there contained. Then draw a right hanging line from the Center or middeſt of that figure, or the middeſt of ſome one ſide. And with that length and the other, enter your Table. Note that the Triangle of all ſides like, and the Quadrate figure are alſo meaſured by this rule.

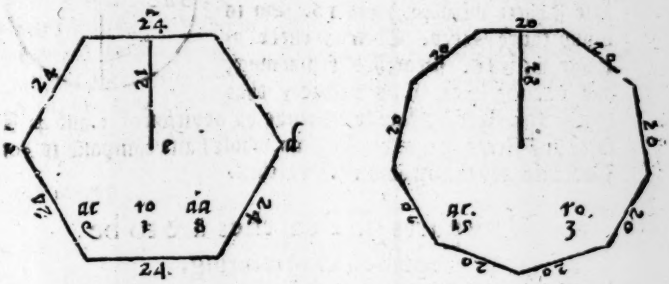
### Enſample.

SUppoſe this figure a.b.c.d. to bee a fire ſquare peece of Land, and euery ſide 24. Pearches. The halfe ſumme of

all

all sides is 72. Pearches: the right hanging pricked line a.c. 21. Pearches. With these two numbers yee must enter your Table of account following hereafter. And doe as is opened in the declaration there adioyned, when Numbers surmount the Table as they doe here.

So shall ye finde 9. Acres, 1. Rood, and 8. Dayworkes, the content of this figure a. b. c. d. Euen thus is the other nine squared figures measured, and such like.




# A Rule for round Land, and the parts thereof.

*The v. Chapter.*

HAlfe the Diameter multiplied in halfe the Circumference, sheweth the content of any Circle.

Archimedes in libello circuli mensurationis.

Or thus more plainely. Yee shall enter your Table with halfe the number of pearches of the whole Circumference or compasse, and with the number of halfe the Diameter or breadth. So haue yee the Content.

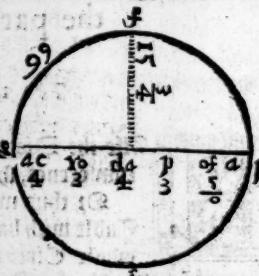
## Example.

Suppose a peece of land, whereof the compasse is 100. Pearches, the breadth 32. Pearches, I would know how much Land is in this figure. Enter your Table with halfe the compasse, that is 50. and with halfe the breadth, that is 16. Pearches. Because in the Table I cannot finde 50. for the greatest length is 40. (therefore I enter with 40.) and 16. So is found foure Acres. Then I enter againe with 16. Pearches remayning, and 16. the breadth as before, that bringeth 1. Acre. Now to conclude by addition of 1. and 4. I finde five Acres in that round Land, whose halfe compasse is 50. Pearches, and the breadth 16. Pearches.

## How parts of Pearches are to be counted in measuring.

For perfect knowledge and ble of this Table following, when parts of Pearches are adioyned, note well this other example that ensueth, and also what is said of the declaration annexed vnto the table, when parts of Pearches are in the length, breadth, or both.

Imagine f.g. h. to bee a round peece of Land: I finde by measure the whole Compasse, 99. Pearches. The halfe is 49. ½. The hanging Line or halfe breadth is 15. ¼. Enter your Table with the whole Pearches, that is 49. and 15. leauing out ½. and ¼. which were but parts of Pearches. So haue




yee

yee 4. Acres, 2. Roodes, 3. Dayworkes, and 3. Pearches. For those parts of Pearches omitted, at your first entring the Table, worke thus. The halfe Pearch, Quarter, or other part of a Pearch in the length, must bee reckoned by themselues in the whole breadth, and those of the breadth contrariewise in the length. If there bee such odde parts in both, then recken them of the length in the whole breadth, and them of the breadth in the whole length, ioyning to the other afore gotten, remembring the product of the one fraction multiplied in the other, to bee pulled from the encreale. To make this matter plaine, I will take this last example before. The one number wherewith I should haue entred my table, was 49. $\frac{1}{2}$. the other 15. $\frac{3}{4}$. I found first by entring with 49. and 15. (omitting the odde parts) 4. Acres, 2. Roodes, 3. Dayworks, and 3. Pearches. Now for the encreale of the parts of Pearches left out, I must (as I laid) recken them of the length in the breadth, and contrariwise them of the breadth in the length. Halfe 15. $\frac{3}{4}$. is 7. $\frac{1}{2}$ Pearches, and $\frac{3}{4}$. Three quarters of 49. is 37. Pearches, $\frac{1}{2}$. Which added, makes 45. Pearches. This adioyned to the number afore gotten, bringeth the whole content of the round figure, which is 4. Acres, 3. Roods, 4. Dayworks, 3. Pearches, and $\frac{1}{8}$. of a Pearch, the product of the one fraction multiplied in the other subducted. What must be done when the numbers wherewith yee should enter, exceede your table, counsell the declaration of your table there adioyned.

## Of the halfe Circle.

For this halfe circle, enter the Table with halfe the compasse, and with halfe the Diameter of the Circle, or with the length of the pricked hanging line, k. l. So the content of this halfe Circle is 2. Acres, 1. Roode, 7. Day worke, 1. Pearch, and $\frac{13}{16}$. of a Pearch.

To measure halfe circled Land.

Another

## Another example of Portions and parts of a Circle.

Suppose n.m.o. following, were part of a Circle or peece of Land, whose Content yee desired. The whole compasse of the Circle which this portion representeth, is (as aforesaid) 99. Pearches: his Diameter or breadth 31. ½. The pricked Arke or Compasse, n.m.o. is 74. Now with the halfe Breadth or Semidiameter of the Circle, 15. ½. and with 37. the halfe of the pricked Compasse: enter your Table. So haue yee 3. Acres, 2. Roodes, 5. Day workes, 2. Pearches, and ¾. of a Pearch, the Content of the peece of Land full of prickes, to the sides of the Triangle pricked.

To measure parts of circled Land.

If ye desire to know the sum of Pearches in the other portion beneath the Triangle, separated by the Line m.o. yee must adde the Content of the Triangle (which is 3. Roodes and ¾. of a Pearch, found by the Rule of Triangles) to the Acres and Pearches before searched. So haue ye 4. Acres, 1. Roode, 5 Day workes, three Pearches, and ½. of a Pearch.

This substracted or pulled from the number contained in the whole Circle, the remaine is the Pearches included in the small peece beneath the Triangle. That is, 1. Roode, 36. Pearches, and ½. of a Pearch.

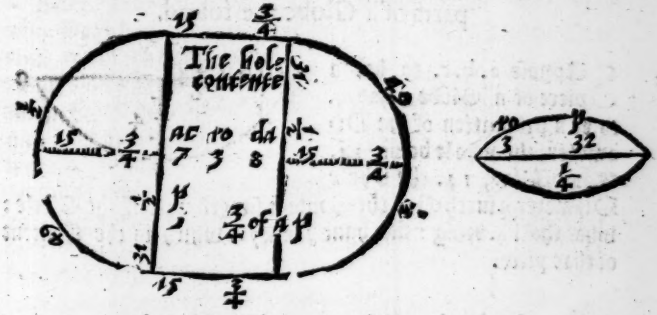
## How mixed Figures are measured.

Land compounded of circles, or his parts.

I Thinke none now will doubt how these two figures following are measured, because they are made of portions or parts of Circles, whose measure is before sufficiently ope-

ned

ned, the one consisting of two halfe Circles, and a Quadrangle: the other being the portions of the Circle, m.o. doubled.




If any euill fashioned Land chance to bee measured, which requireth to be brought into many Triangles to saue labour, yee may adde some portion vnto that, and make it Square, or otherwise. So let them bee measured: and after, from the product pull away that yee added: the remaine is the Content.

## To finde the content superficiall of Steeples, Columnes, Globes, and their parts.

To measure Steeples, Columnes, Globes, &c.

TO the Arithmetician, I say: for picked Steeples, multiply the whole side in halfe the circumference of the Base, adding the plaine of that Base. For pillers: augment the Circumference of the Base in the Heights, putting to the plaine of both Bases. For Globes, the diameter in the Circumference multiplied. Euen so of fragments or parts. Let them that bee voide of Arithmetike enter my Table of account following, with such numbers as I now willed the Arithmetician to multiply, not forgetting what I haue before written. So I serue their turne.

# The Art of measuring

## Or thus by the rule of proportion, the parts of a Globe are found.

To measure parts of Globes.

Suppose a. b. c. to bee a peece of a Globe, and 4. to be a proportion of the Diameter, the whole being 14. Thus I say, 14. the whole Diameter giueth 616. the Content superficiall of the Circle: what shall 4. bring: So haue yee 176. which is the Content of that peece.

## To finde the Diameter by some knowne portion thereof.

To finde the vnknowne Diameter of a Globe.

If ye bee ignorant what length the Deameter of the Globe is, whose proportion yee haue, the height or part of the Demecient being 4. foot, augment halfe the line a. b. which is 6. $\frac{1}{2}$. in himselfe, and the product diuide by 4. So haue yee 10. to be added to 4. which maketh 14. the whole Diameter.

## The true measuring of Mountaines and Valleyes.

*The vi. Chapter.*

To measure Mountaines.

If ye shall measure the circuit of the foot, or vale of the Mountaine: then the compasse of the summity or top, adding them together. So shall ye doe of the Alcenses, that is, the going vp from the foot to the top, ioyning the measure of the longer and higher in one. Now take the halfe of the circuit added, and the halfe part of the Alcenses ioyned, and enter your table: there shall ye see the Content.

Ensample.

Enſample.

A.b.c. is the mountaine: a.c. the circuit of the Baſe, being 100. Pearches, b. the top 16. Pearches. Which ioyned together, make 116. b. c. the one Aſcenſe is 55. Pearches: the other 75. Theſe added make 130. The halfe of the circuits is 58. the halfe of the Aſcenſes 65. with theſe two ſummes yee ſhall enter your table of account, where ye ſhall find 23. Acres, 2. Roodes, and 10. Pearches, the true content of this figured hill.

Figure of a Mountaine.

## Of the Valley.

AS in the Mountaine yee meaſured the circuit or compaſſe of the Baſe or Foote: ſo here contrary yee ſhall meete round about the circuite or compaſſe of the height of the Valley. And as yee got the meaſure or compaſſe of the top of the Mountaine, ſo meaſure the circuite of the depth of the Valley. In like manner as yee meaſured the Aſcenſe, that is, the going vp from the foote to the top: ſo meaſure the Deſcenſe or going downe of the Hill to the depth of the Valley. The reſt all worke, as I haue ſhewed you in meaſuring the Mountaine. To meaſure Valleyes.

For more plainneſſe, behold this enſample or figure. If yee lay together the circuites of the height and depth, which is 210. and 30. taking the halfe art of thoſe two Circuites, making

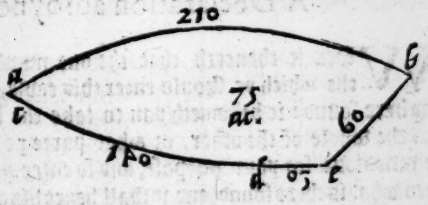



Figure of a Valley.

an 120. then the two Ascenses 140. and 60. added in one product 200. the halfe thereof being 100. with this and 120. the other halfe of the Circuite, ye may enter your table. That doing, loe 75. Acres.

## How the Table of account now following, is to be vsed.

What is to bee done when numbers, with which you should enter, exceede your Table.

When you haue gotten a conuenient Length and Breadth (as I haue aboue declared by diuers triangles and other figures) then you shall enter this Table. Seeke there the Length, and most number of Pearches in the higher margine, which beginneth at 1. and endeth rightward at 40. Looke the other summe of Pearches (I meane the breadth) in the right side and hanging margine, from 1. descending to 30. Now at the meeting of the lines, where the one answereth the other directly in a square, you shall finde the Acres, Roodes, Day workes, and Pearches. Note that the first number set on the left side, and vpper part in any square, signifieth the number of Acres. The figure 1. set in the vpper part, and right side, doth betoken a Roode: the figure 2. there two Roodes. 3. three Roodes. And the figure in the left side beneath, signifieth a Day worke, or Day workes. A figure in the lower part rightward, declareth Pearches.

## A Declaration adioyned.

When it chanceth that the one number or both with the which ye should enter this table, are greater then any here found: it behoueth you to take the halfe of the one, and the whole of the other, or what parts ye list of both, most commodious for your purpose, and so enter your table. Looke then what is there found, and it shall beare his name of the parts multiplied in themselues.

Ensample.

## Enſample.

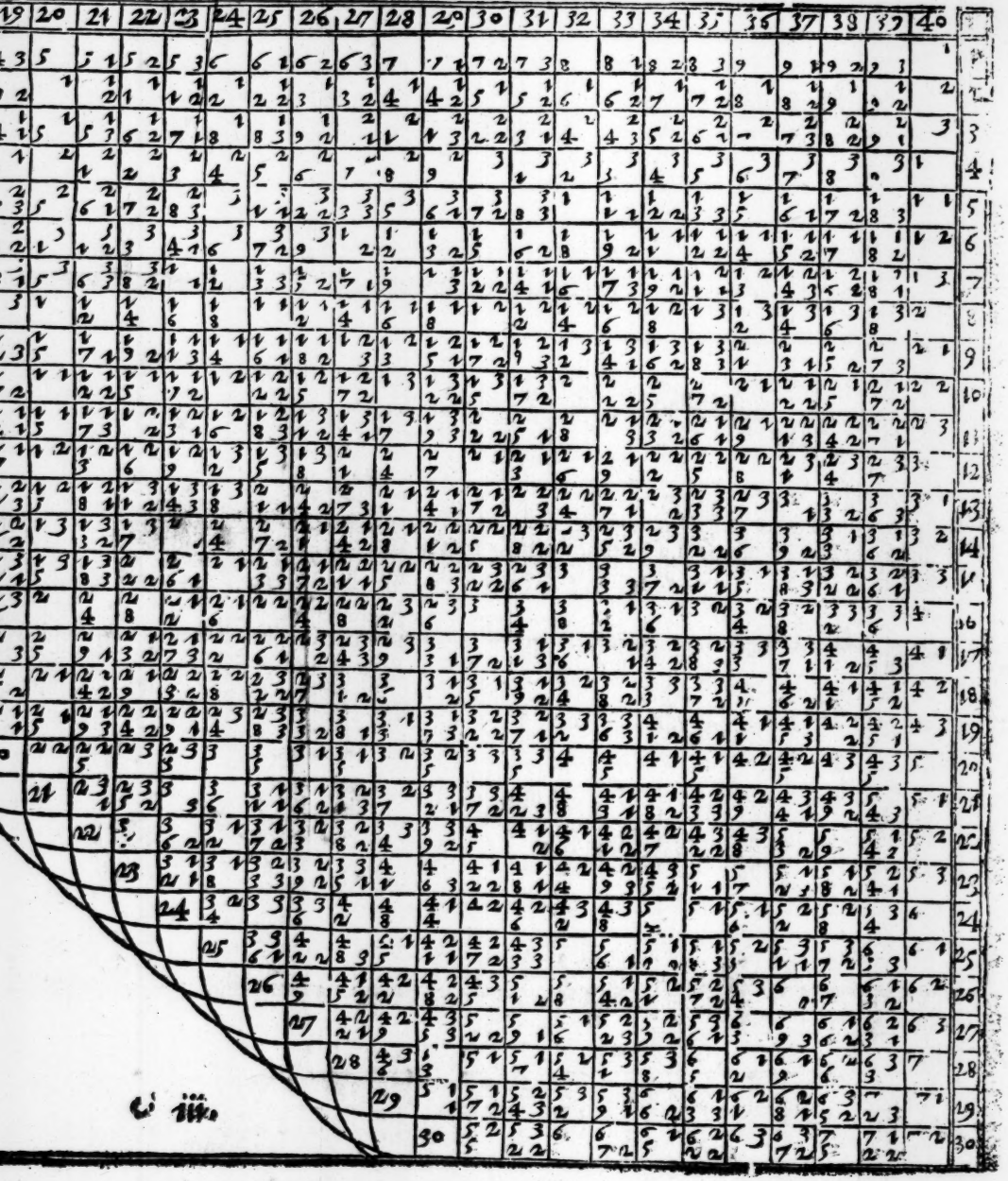
Suppoſe the number with the which yee ſhould enter your table to bee 130 Pearches in length, and the breadth 60. neither of theſe may be found in the Margines: wherefore I take the third part of an 130. which is 34. Pearches, and one remaineth.

The halfe 60. that is 30. I finde with entring them at the common meeting, 6. Acres, 1. Roode, and 5. Day workes. This ſumme muſt haue his name of the parts augmented in themſelues. I tooke the third part of the one, and halfe the other number, therefore 2. muſt be multiplied in 3. or contrarie: ſo haue ye ſixe, which ſignifieth that ye haue found by entring, but the ſixth part of the number ye ſhould finde. Wherefore I muſt take this ſumme tofore found (being Acres, 1. Roode, and 5. Day workes) ſixe times as much. So haue ye 33. Acres and one Roode. For the Pearch remaining in length, reckon him in the breadth (as is afore declared) in the fifth Chapter of the Remaines: ſo haue yee 60. Pearches more to be added. So the encreaſe of theſe two numbers, 103. and 60. amount to 38. Acres, two Roodes, and 5. Day workes. Thus any manner length and breadth is reduced to this table following, which ſufficeth.

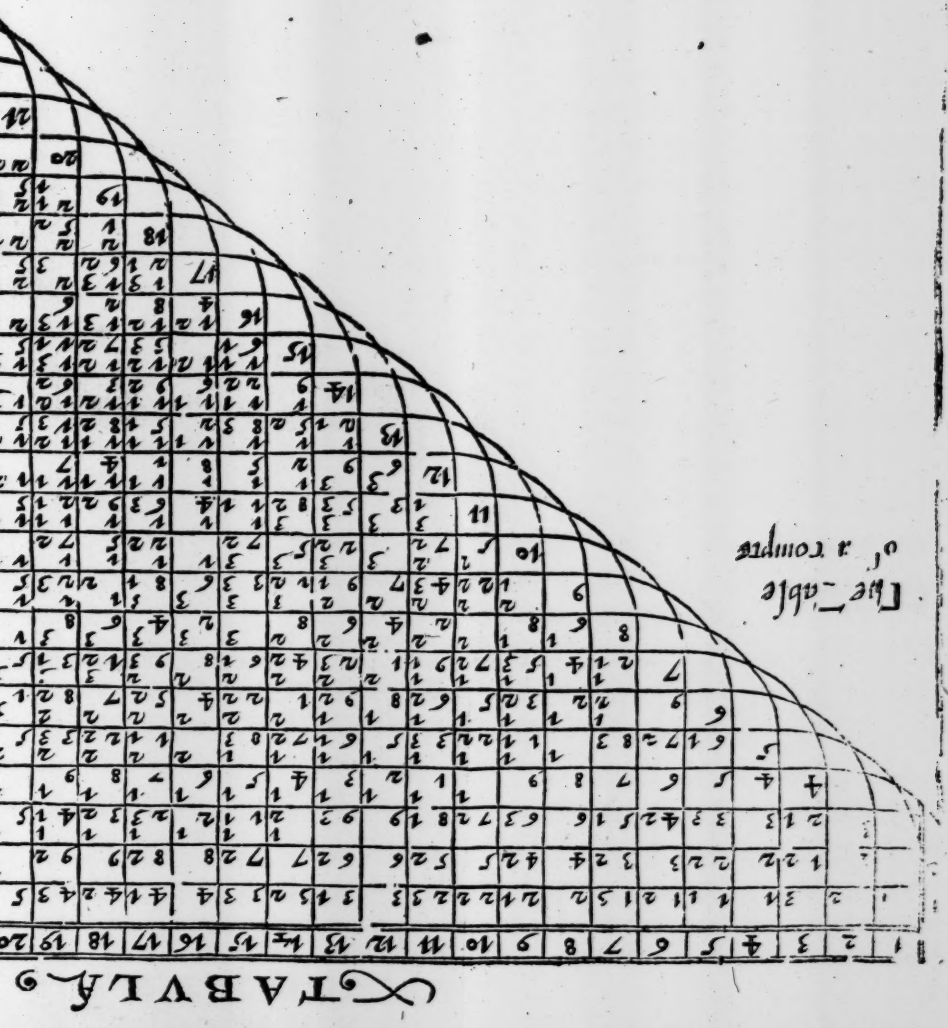
Looke what I haue ſhewed in the Chapter of parts, that vnderſtand here of whole Pearches, leſt ſubſtracting, &c.

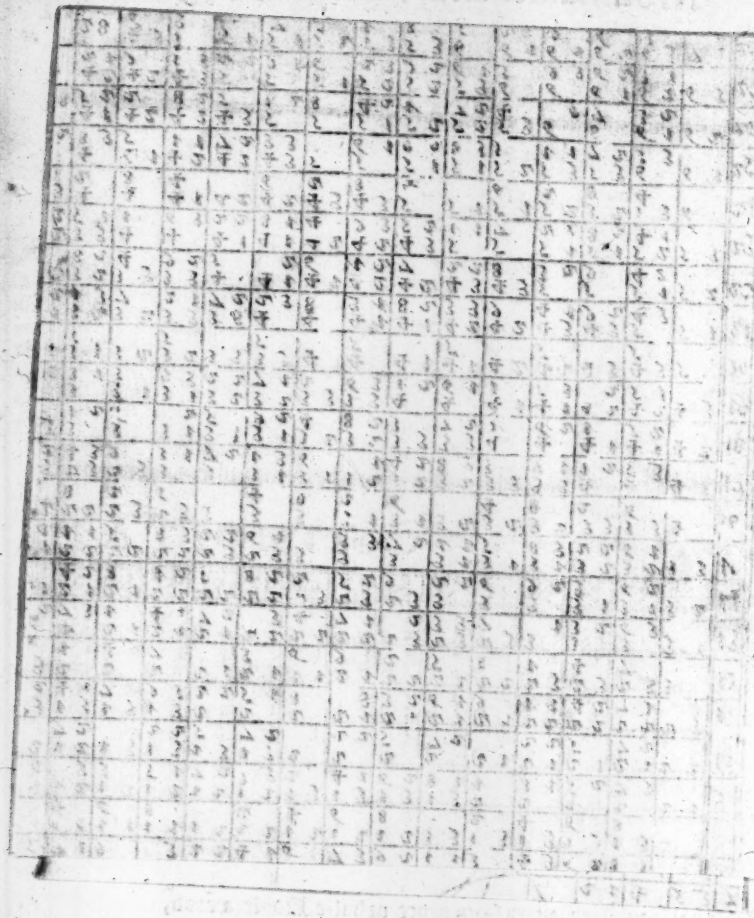
Thus with few words is ended the certaine meaſuring of all manner Land, touching the Superficiall Contents. Wherefore now ſhall follow the true meaſuring of Timber, Stone, Steeples, Pillers, Globes, according to their Craſſitude.

Such as are altogether ignorant of Arithmetike, may reckon by our Engliſh coyne, allowing for euery Pearch in length or breadth a penny, and ſo euery Marke makes an Acre, euery Noble halfe an Acre, euery forty pence or halfe Noble, a roode, and euery penny a ſquare Pearch. And ſo by memorie without tables, may in ſome rude and groſſe manner, caſt by reaſonable iuſt the true Contents of all Cloſes, Medowes, Parkes, Hils or Valleyes.



Place this Table after the White page in C.





# To the Reader.

IT commeth commonly to paſſe, that Carpenters, Maſons, and ſuch like Artificers, are put either to meaſure timber euery way ſquare, or ſquared logs, broader on the one ſide than on the other: yea many times mutilate or vnperfect ſtuffe. Sometimes three, fiue, tenne, or twenty, ſquare in the head, and ſo through: oftentimes round Stone or Timber with hollowed, &c. Afore I ſhew vnto them what muſt bee done with ſuch pieces of Timber or Stone, to get their true meaſure, my deſire ſhall bee that ſuch Craftſmen will leaue to be heady or ſelfe willed: yea ſo greedily to ſticke to their corrupted rules, that vtterly they refuſe to be taught.

Both learning and experience declareth vnto me, that the grounds which the beſt of them haue, are falſe. To open how and where, it needeth not: neither doth it appertaine to inſtruction, onely it may ſuffice him that liketh the true way, here to receiue it appointed to him. Yet to ſatisfie and content him which will not beleeue any ſuch errours or falſe grounds to bee, I ſay (and truely) that the Ruler of Timber meaſure, which the moſt part of them hath, is not made by right Art: Beſides that, their craft in ſeeking the Square of ſome Timber is very falſe. They vſe in meaſuring, to lay the broader and narrower ſides together in a ſumme, and to take the halfe of that number for the Square. Then they ſeeke this vntrue Square vpon the falſe Ruler, and ſo meaſuring the Timber, they conclude of it vntruely.

As

In a foote ſquare is contained 172. Inches.

As this is corrupted, ſo are other Grounds which they take to be infallible. Now to the purpoſe: touching the correction of thoſe Errours, with other not mentioned, whereby true meaſuring may enſue, this way ſhall be taken. After I haue opened how you muſt handle all ſuch faſhioned Timber (as afore is ſpoken of) there ſhall follow a Table in which yee may finde (as I will declare) the Square of any Stone or Timber. That knowne, it is requiſite to haue another Table immediately following, which may appoint to all true Squares from 1. to 6. inches, the iuſt length to make a foote euery way Square. With the length agreeable to your Square, your Logge muſt bee meaſured. And as oft as ye finde it from the one end to the other of your Timber, ſo oft you may conclude the foot Square to bee contained in that Timber Logge, or Stone: that is, ſo many Square Feet there to bee included. This Table of Timber meaſure ſtandeth in the place of a good Ruler, well decked with true meaſures. By this yee may make or correct Rulers at pleaſure, as after appeareth.

*Now orderly followeth the true meaſuring of all faſhioned Timber or ſtone aforenamed.*

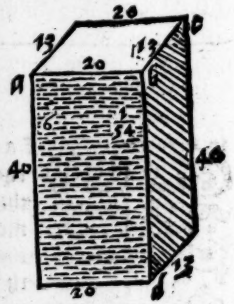
# How Timber or Stone foureſquare euery way, or broader on the one ſide than on the other, is meaſured.

*The vij. Chapter.*

IF a piece of Timber or Stone, bee either equally ſquare, broader on the one ſide, than on the other, yee ſhall take the iuſt meaſure, I meane, how many Inches the broader ſide containeth: euen ſo of the narrower. This done, yee muſt ſeeke in the Table of ſquares following, the meaſure of the broader ſide of the Timber or Stone, in the vpper margine of that Table. Then looke for the number of Inches, of the equall or narrower ſide, in the right part and hanging Margine. At the common meeting where the one number anſwereth directly to the other, there your true Square ſhall appeare. This ſquare ſo found, ſhall bee referred to your Table of Timber meaſure: in the which you may plainely ſee (if you runne downe by the left Margine, vntill your Inches ſquare appeare) how many Feet or Inches of your Ruler belong to a Foote ſquare. As often as that meaſure there found, is contained in the Timber or Stone, ſo often and as many Feete ſquare yee may conclude (without doubt) the piece of Timber or Stone to haue.

## Ensample.

Suppose this squared Timber or Stone a. b.c.d. were to be measured, the broader side a. b. 20. Inches, the narrower side b. c. 13. Inches, the length 40. Inches. Now I must seeke the broader side 20. in the vpper Margine of the table. The narrower side 13. must bee found in the right side and hanging Margine. At their common meeting 16. Inches, and $\frac{1}{17}$. part of an Inch shall appeare. This true square must bee searched for in the table of timber measure. Therefore looke for 16. in the Margine of this table. In the Squares with him rightward, ye shall finde 6. inches, and $\frac{3}{4}$. which is three quarters of an Inch. Some deale lesse of your Ruler than 6. and $\frac{3}{4}$. laid out vpon the timber, maketh a Foote Square. And that measure so directly handled, is contained in the Length of your Timber fiue times. Wherefore affirme fiue Foote there to be, beside that is left $\frac{1}{17}$. part of a Foote. Note because the Squares at all times (in this Ensample) rise not to euen Inches, but sometime to odde parts: therefore according to your discretion, adde or take away some part more or lesse in setting forth the Foote Square, as aboue is performed.




It were intolerable tediousnesse, yea impossible to set forth the true quantities of timber measure, to all odde Quantities of Squares. The discreete handling of these, the wittie shall bring to a sufficient exactnesse.

Of

# Of Timber or Stone, 3.5.10.20. or moe ſides Square, &c.

*The viij. Chapter.*

When Timber hath diuers equall Squares in the head, and ſo throughe: firſt, meaſure all the ſquare ſides round about the head or end of the Timber. Then take halfe the number of the whole meaſure for one breadth.

When meaſure from the Center (which is the middle of the head, or end of the Timber) to the middeſt of the Square ſide, betweene the two Angles, and take the meaſure of that diſtance for the other breadth. Now reſort with the meaſures of theſe two breadths, (as tofore) to the Table of Squares: ſeeing the bigger number or breadth in the vpper Margine, and the other leſſer in the ſide Margine. With the ſquare there found, haue recourſe to the Table of Timber meaſure, and doe as I haue inſtructed.

Enſample.

Admit this ſmall piece of Timber fiue ſquare, e.f.g.h. ſhould bee meaſured, euery ſide being 12. Inches. If ye adde together in one ſumme all the fiue ſides, they make 60. Inches. The halfe is 30. that ſerueth for one breadth. Then the Line e.f. which goeth from the Center or middeſt of the Square, to the middle of one ſide, is 8. Inches. The two number 30. and 8. muſt be ſought (as before) in the table of ſquares following. At the common meeting, your ſquare ſhall appeare 15. Inches, & $\frac{1}{2}$. This ſquare 15. ſeeke in the Table of Timber meaſure. There yee may ſee right with it 7. Inches, and $\frac{2}{3}$. Now becauſe of $\frac{1}{2}$. the odde quantitie of the

Square aboue 15. Inches, lay ſomething leſſe. Then ſee how oftentimes that meaſure (ſo with diſcretion handled) is from the one end of your Timber to the other: and affirme ſo many times a Foote ſquare there to be, as that meaſure is found in the length of your Logge.

## How round and hollow Timber, Steeples, Pillers, Globes, &c. are to be meaſured.

*The ix. Chapter.*

FIrſt gird the Logge round about with ſome Line: then diuide the Line which compaſſeth that timber in two equall parts: keepe the one part for the bigger breadth. After, ye ſhall diuide againe that whole length (the two and twenty part caſt away) in three parts, and take the halfe of one of them for the other narrower breadth. With the meaſures of theſe two breadths, haſte to your table, performing all things as afore is opened.

Enſample.

Suppoſe this little piece of Timber, i.k.l.m. were to be meaſured, the compaſſe or girding 36. Inches, and the halfe of that is 18. being the one breadth: then the third of 36. is 12. the halfe of it is 6. which is the other narrower breadth, with theſe two numbers 6. and 18. enter the Table of ſquares following, and ſo the table of Timber meaſure. At the laſt (all things performed as before) yee ſhall finde in this round Logge, the length l.m. being 18. Inches, 1. Foote, and $\frac{1}{8}$ part of a Foote. This is ſufficient for all ſuch like.

## A note of hollowed Timber.

IF it chance that hollowed Timber bee to bee measured: measure the whole Logge as though it were not hollow, as aboue is declared. Then measure the narrower and broader side of the hollow, and see what is contained in that, as though it were massie Timber. Now pull out the content of it, from the whole aboue measured: the remaine of force must shew what timber is included in that hollowed body.

I Am vnable in few words to expresse to the vnlearned, by what meane Pyramidall, or picked regular Steeples of all fashions are measured. Also how Pillers, how the content of Globes or Bowles are searched, vnlesse the Art of numbring were talked. That being knowne: thus (as now followeth) I teach.

## How the crasitude of picked Steeples is knowne.

MUltiply the plaine of the Base in the third part of the Height: so yee haue the Crassitude. Or multiply the Content superficiall (found as I haue instructed) in the Height of the Steeple, taking for your purpose the third part of that product.

## How the Content of Pillers is knowne.

ENcrease the Base plaine in his Altitude or Height: so haue ye your desire.

## How the Cubicall bodies of Globes are searched.

The content Superficiall found, (as I haue opened) must be multiplied in the sixth part of the Diameter: the product is that wee require: Or the third part of the superficiall Content in halfe the Diameter. Or multiply the plaine of the Circle in the whole Diameter: then take two third parts which added, make the Crassitude.

## Of the halfe Circle.

His Superficiall Content multiplied (as I said) bringeth the magnitude of him. If any man require ensamples of these last matters, or more sufficient handling: let them resort vnto my bookes published of Geometrie, where they shall be satisfied. These little appertaine to Carpenters or Masons therefore not by ensample declared.

## A generall note.

When thou shalt bee put to measure some Body, without order or fashion, lacking part of his Square, or hauing more than his Forme: if it lacke thou shalt make it perfect, by obseruing diligently the running together of the sides. The parts wanting shall bee measured, as though they were there, which portions must be taken from the whole Body measured.

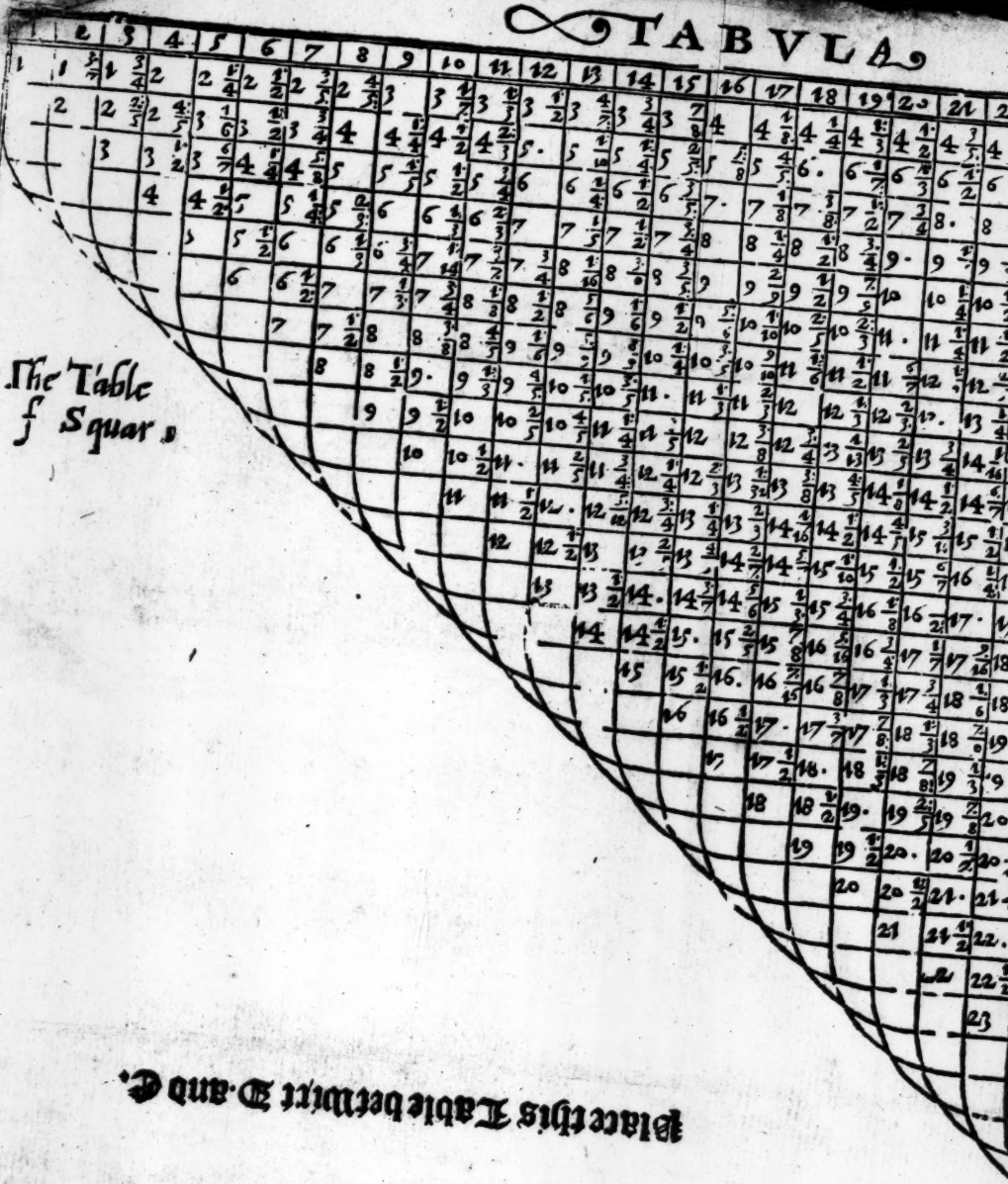
Also when there resulteth any more than the forme or Regular Square: first measure the square Body: then the Crassitude which aboundeth. All put together, doe shew the whole irregular Body. This sufficeth.

# A Table to finde the iuſt Radix or Square of any Timber or Stone.

IT behoueth you to know, that this table following is made for the true ſquare of any manner timber: therfore vnderſtand that the numbers from 1. to 40. ſet aboue in the high Margine, betoken the Inches of the broader ſide of the timber. And the numbers from 1. and ſo downeward to 30. put in the right part and hanging Margine of this table, ſignifie the Inches of the narrower ſide: and to conclude briefly, the Element or figures ſet in euery ſquare roome, betoken the iuſt ſquare. The bigger figures leftward in euery ſquare place, ſignifie the whole Inches. And the other leſſer rightward in the ſame ſquare diuided by a line, the parts of Inches, as $\frac{1}{3}$, &c.

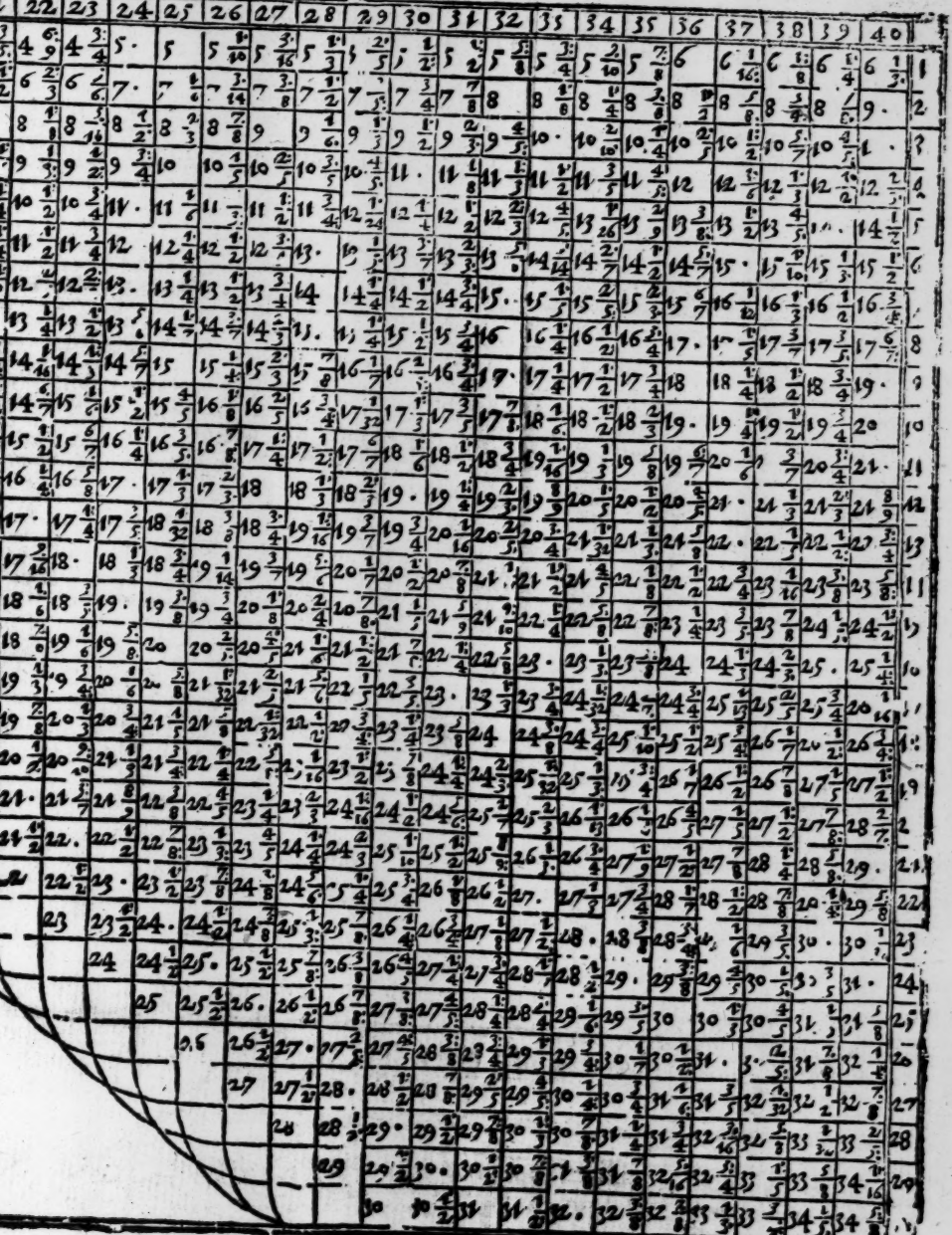
This firſt Fraction toward the left hand, betokeneth one halfe part of an inch: the other two fifts of an Inch, and euery figure or fraction hauing a point adioyned vnto him, ſome deale leſſe than that part is: as that part, $\frac{1}{3}$ repreſenteth ſcant halfe an Inch, a very little quantitie leſſe. And if it had two prickes by him, he ſhould haue declared ſome quantitie more: as this other fraction or part, $\frac{2}{3}$: which is more than two fifts, a ſmall deale.

It had not beene needfull to haue put the parts of the Square ſo preciſely as they are here: neither is it requiſite ſo curiouſly to take them.



The Table
of Squar

Place this Table between B. and C.



# The Table of Timber measure, with the declaration and vse of it.

*The x. Chapter.*

THis Table (as yee see) is diuided into two Columnes or Rowes: the one very short, the other longer. In the head of the first, I haue put this word Foot: in the second row, Inches, and parts to signifie Feet, Inches, and parts of Inches. The summes in the margine and left part of the first and second columne, declare the quantitie of the square of Timber or Stone from 1. to 35. Inches square. Within the rowes you may find the iust length to a foot square, if ye enter into them in right order according to the square.

Ensample.

SUppose the square of your Timber were 7. Inches, and that yee desired to know what measure or length of the ruler would make a Foote square: seeke in the left margine, seuen Inches: and with him in that order toward the right hand, ye shall finde 2. foote 11. Inches, and $\frac{2}{7}$ of an Inch. Note because the fraction $\frac{2}{7}$ hath a pricke by him, it betokeneth some small quantitie lesse then $\frac{2}{7}$ of an Inch. If it had two prickes or points thus: $\frac{2}{7}$ it should signifie some little quantitie more. Neither maketh it matter whether yee obserue this pricking or no, the quantitie is so little to bee added or pulled away.

Note what hath beene spoken of Timber, the same also is to bee vnderstood of stone, likewise to bee measured.

Thus is finished the measuring of Timber. Now ensueth of boord.

| Foote | | Inches | Partes |
|---|---|---|---|
| 1 | 144 | | |
| 2 | 36 | | |
| 3 | 16 | | |
| 4 | 9 | | |
| 5 | 5 | 9 | $\frac{3}{25}$ |
| 6 | 4 | | |
| 7 | 2 | 11 | $\frac{2}{7}$ |
| 8 | 2 | 3 | |
| 9 | 0 | 21 | $\frac{1}{3}$ |
| | 10 | 17 | $\frac{2}{7}$ |
| | 11 | 14 | $\frac{2}{7}$ |
| | 12 | 12 | |
| | 13 | 10 | $\frac{1}{5}$ |
| | 14 | 8 | $\frac{13}{16}$ |
| | 15 | 7 | $\frac{2}{3}$ |
| | 16 | 6 | $\frac{3}{4}$ |
| | 17 | 6. | |
| | 18 | 5 | $\frac{1}{3}$ |
| | 19 | 4 | $\frac{25}{32}$ |
| | 20 | 4 | $\frac{5}{16}$ |
| | 21 | 3 | $\frac{11}{12}$ |
| | 22 | 3 | $\frac{4}{7}$ |
| | 23 | 3 | $\frac{1}{4}$ |
| | 24 | 3 | |
| | 25 | 2 | $\frac{3}{4}$ |
| | 26 | 2 | $\frac{9}{16}$ |
| | 27 | 2 | $\frac{3}{8}$ |
| | 28 | 2 | $\frac{1}{5}$ |
| | 29 | 2 | $\frac{1}{16}$ |
| | 30 | 1 | $\frac{11}{12}$ |
| | 31 | 1 | $\frac{4}{5}$ |
| | 32 | 1 | $\frac{11}{16}$ |
| | 33 | 1 | $\frac{5}{8}$ |
| | 34 | 1 | $\frac{1}{2}$ |
| | 35 | 1 | $\frac{3}{7}$ |
| | 36 | 1 | $\frac{1}{3}$ |

Square Inches of the tymbre

## How Tables, Boords, Glaſſe, or any ſuch like, are meaſured, according to their length and breadth, onely to the foot ſquare.

### *The xi. Chapter.*

THis thing is perfourmed by the helpe of a large Table following, diuided in fiue ſmall Tables, and as many Margins. The firſt and left Margin beginneth at $\frac{1}{4}$. which is one quarter of an Inch, and extended to fiue Inches, as ye may plainely perceiue if ye runne downe by that Margin. This hath his Table on the right ſide adioyning vnto him. The other taketh his beginning at fiue Inches, $\frac{1}{4}$. and endeth at twelue, hauing his proper Table alſo. The third from 12. $\frac{1}{4}$. to 18. And ſo from 18. $\frac{1}{4}$. to 24. from 24. $\frac{1}{4}$. to 30. The laſt Margine is from 30. $\frac{1}{4}$. to 39. and there endeth.

Of this that is ſaid, you may gather that euery Margin hath his Table on his right ſide. Alſo you muſt know that in the top, and beneath, I haue put (as in the Table of Timber meaſure) theſe words, Foot, Inch, and parts, to ſignifie, Feete, Inches, and parts of an Inch. Whenſoeuer yee liſt to meaſure boord, Glaſſe, or any other ſuch, with the breadth of it, enter this table, and ſeeke that breadth in his proper margin, there ye ſhall finde in right ouer how many Feet, Inches, or parts of an Inch, belong to a Foote ſquare. So often as the meaſure is in your ſtuffe, iuſt as many Feete haue ye in that Boord, or ſuch like. If the breadth exceed this table, then diuide the breadth in parts, and worke as is aboue ſhall be declared. So the ingenious applieth this Table for all manner breadths, moſt exactly.

Example.

| Fo Yn | | | Fo Yn | | | Yn Par | | | Yn Par | | | Yn Par | | | Yn Par | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4 | 48 | 0 | 1/4 | 1 | 11 1/25 | 12 | 1/4 | 11 3/4 | 18 | 1/4 | 7 7:/8 | 24 | 1/4 | 5 15:/16 | 30 | 1/4 | 4 3:/4 |
| | 1/2 | 24 | 6 | 1/2 | 1 | 10 1:/7 | 12 | 1/2 | 11 1/2: | 18 | 1/2 | 7 4/5: | 24 | 1/2 | 5 7:/8 | 30 | 1/2 | 4 5:/7 |
| | 3/4 | 16 | 6 | 3/4 | 1 | 9 1/3: | 12 | 3/4 | 11 2:/7 | 18 | 3/4 | 7 2/3: | 24 | 3/4 | 5 4:/5 | 30 | 3/4 | 4 2:/3 |
| | 1 | 12 | 7 | | 1 | 8 4/7: | 13 | | 11 1:/15 | 19 | | 7 4/7: | 25 | | 5 3/4: | 31 | | 4 5:/8 |
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| 1 | 1/2 | 8 | 7 | 1/2 | 1 | 7 1/5: | 13 | 1/2 | 10 2:/3 | 19 | 1/2 | 7 7:/8 | 25 | 1/2 | 5 5:/8 | 31 | 1/2 | 4 4/7: |
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| 2 | | 6 | 8 | | 1 | 6 | 14 | | 10 2/7 | 20 | | 7 1/5: | 26 | | 5 1:/2 | 32 | | 4 1/2 |
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| 3 | 1/4 | 3 8 1:/3 | 9 | 1/4 | 1 | 3 4:/7 | 15 | 1/4 | 9 3:/7 | 21 | 1/4 | 6 4/5: | 27 | 1/4 | 5 2:/7 | 33 | 1/4 | 4 1:/3 |
| 3 | 1/2 | 3 5 1:/8 | 9 | 1/2 | 1 | 3 1:/7 | 15 | 1/2 | 9 2:/7 | 21 | 1/2 | 6 5/7: | 27 | 1/2 | 5 2:/9 | 33 | 1/2 | 4 2:/7 |
| 3 | 3/4 | 3 2 2/5: | 9 | 3/4 | 1 | 2 3:/4 | 15 | 3/4 | 9 1:/8 | 21 | 3/4 | 6 5:/8 | 27 | 3/4 | 5 1:/5 | 33 | 3/4 | 4 1:/4 |
| 4 | | 3 | 10 | | 1 | 2 2/5 | 16 | | 9 | 22 | | 6 1:/2 | 28 | | 5 1:/8 | 34 | | 4 1/4 |
| 4 | 1/4 | 2 9 7/8: | 10 | 1/4 | 1 | 2 1:/21 | 16 | 1/4 | 8 6:/7 | 22 | 1/4 | 6 1/2: | 28 | 1/4 | 5 3:/32 | 34 | 1/4 | 4 3:/16 |
| 4 | 1/2 | 2 8 | 10 | 1/2 | 1 | 1 3/4: | 16 | 1/2 | 8 3/4 | 22 | 1/2 | 6 3:/8 | 28 | 1/2 | 5 1:/16 | 34 | 1/2 | 4 1:/6 |
| 4 | 3/4 | 2 6 1:/3 | 10 | 3/4 | 1 | 1 3/8: | 16 | 3/4 | 8 5/8 | 22 | 3/4 | 5 1/3: | 28 | 3/4 | 5: | 34 | 3/4 | 4 1:/8 |
| 5 | | 2 4 4/5 | 11 | | 1 | 1 1/11 | 17 | | 8 1/2 | 23 | | 6 1:/4 | 29 | | 5: | 35 | | 4 1/8: |
| 5 | 1/4 | 2 3 3/7 | 11 | 1/4 | 1 | 4/5 | 17 | 1/4 | 8 1:/2 | 23 | 1/4 | 6 1:/5 | 29 | 1/4 | 4 7/8 | 35 | 1/4 | 4 3:/32 |
| 5 | 1/2 | 2 2 1:/3 | 11 | 1/2 | 1 | 1/2: | 17 | 1/2 | 8 1:/3 | 23 | 1/2 | 6 1/8: | 29 | 1/2 | 4 7/8 | 35 | 1/2 | 4 1/16 |
| 5 | 3/4 | 2 1 1/23 | 11 | 3/4 | 1 | 2/7: | 17 | 3/4 | 8 3:/32 | 23 | 3/4 | 6 1:/16 | 29 | 3/4 | 4 5/6 | 35 | 3/4 | 4 1:/32 |
| 6 | | 2 | 12 | | 1 | | 18 | | 8 | 24 | | 6 | 30 | | 4 4/5 | 36 | | 4 |
| Fo Yn | | | Fo Yn | | | Yn Par | | | Yn Par | | | Yn Par | | | Yn Par | | |

## Ensample.

SUppose I haue a pane of Glasse, or a Boord, whose breadth were 22. inches, $\frac{1}{4}$. the length 16. foot. In the fourth margine, I finde this breadth, 22. and $\frac{1}{4}$. And euen with it in the table rightward, I see 6. inches, $\frac{1}{4}$. So much of my Ruler wanting some small quantity, maketh a foot.

Now because in the length of my boord (which is 16. foote) that measure is found 29. times, and $\frac{2}{3}$ parts: I conclude 29. foote there to be, and two third parts of a foote Square, according to the length and breadth I said (wanting some small quantity) because of the point ioyned to this fraction $\frac{2}{3}$. which is put to diminish the fraction some little thing, as is declared plainely in the other Tables before put forth.

HE that desireth to measure chamber floores, pauements, or such like, let him onely multiply the breadth with the length, so the product sheweth the Content.

## Ensample.

IF there were a pauement 100. foot long, and in breadth 50. I must needs conclude by multiplication of the length in the breadth there to be contained 5000. foot.

## Or thus without Arithmeticke, when the breadth exceedeth the Table.

DIuide the breadth in parts (as is opened in the Declaration of the table of account) and worke as I haue before instructed. So for pauements all manner of wayes it serueth your turne. Of this matter to put forth tables, were superfluous tediousnesse and folly. The ingenious with these few will be satisfied.

# The Carpenters Ruler.

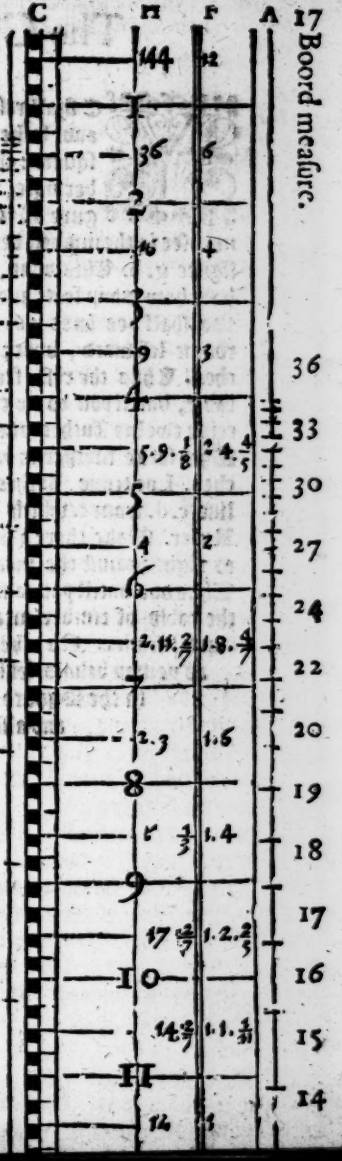
The face of the Carpenters Ruler, figured with the *true measures, and other* things necessary.

## *The xij. Chapter.*

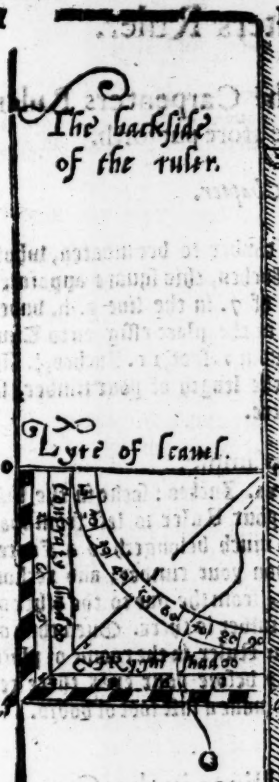
BEcause the effect of this ruler is aboue declared by tables, an instrument also well knowne & common among good Artificers, I will not spend many words in opening it. Behold the figures and learne by them how yee ought to make and commonly to decke your ruler, both with timber and boord measure.

Ensample.

Admit the Ruler to bee a. b. c. d. well plained 12. Inches long, a quarter of an Inch thick, and two Inches in breadth. Truely it were more commodious, if it had two foote in length. This ruler here imagined, but a foote in length is diuided first in 12. euen parts called inches: then euery inch in halfe or two equall portions: each halfe in two quarters: euery quarter in foure or 2. parts at the least: as in this ensample. Then are the figures placed from 1. to 12. manifesting the Inches. Thus your ruler is ready to receiue the measures which are marked or figured on your Ruler thus. Aboue first the timber measure as fol-



YE shall resort to your table of Timber measure, and seeke how many feete belong to one Inch square: there yee shall finde 144. This number note, write, or rather graue, where this figure 1. representing one Inch, is figured as ye may see in the middest betweene the line c. f. and the line of the figure g. h. This done, resort to your table againe, and behold how many feete and parts two Inches square requireth. So shall yee finde 36. foote, which is placed in the next roome leftward, vnder the Character 2. signifying two Inches. Thus the rest, feete, Inches, and parts, found in your table, vntill you come to the 12. Inch, where yee shall perceiue twelue Inches onely to bee set in his proper roome, &c. Then seeke further in your table what belongeth to 13. Inches. Loe tenne Inches and $\frac{1}{7}$ This must bee numbred in the line c. d. from c. which line betokeneth the thickenesse of the Ruler. Make there a little strike vpon that grossenesse, euen or right against the measure 10. What needs many words? Thus doe vntill you come to 36. Inches, and that is noted (as the table of timber measure sheweth) right with one Inch and $\frac{1}{7}$ from c. No otherwise is perfourmed of board measure, as ye may behold set forth by the helpe of his proper table in the Square roomes beneath the line c. f. and also the other thicknesse or line b. a.




## The backside of the Ruler, with the quadrant Geometricall.

### *The xiy. Chapter.*

The making of a Geometricall quadrant.

THis other figure i.k.l.m. is the backside of your ruler, hauing in the middest of Geometricall quadrant n. o. p. q. whose making in few words is thus expressed. The line of breadth of your ruler n.o. the line o.p. p.q. q.n. ought to be of one equall iust length, cutting each other squarewise. And from the center n. vnto p. is drawne another line, which is called the line of height. So is o.n. the line of leuell. q.n. the line of height vpright. This knowne, I open my compasse, one foot remaining. In the center n. the other extended in the line of leuell almost to o. making a circumference to q.n. which is a portion of a circle named a quadrant, and ought to be diuided into 90. equal parts, as ye may behold, euery of them called a degree. Yee may diuide the lines o.p. p.q. named the Scale eache in 12. as here, or in 60 yea in 100. equal portions is more meete for the vse of shadowes, heights, lengths, &c. Note that the side or halfe Scale, o.p. is called the contrary shadow p.p. right shadow. Remember that vpon the thicknesse m. k. yee ought to haue two fine equall square sights well bored, represented here by r.s. made of wood, or rather mettall to bee

Note these three principall lines.

The diuided sides o.p. and p.q. are called the Scale.

## The common vſe of the Carpenters Ruler, touching the Face afore put forth.

*The xiiij. Chapter.*

The eight Chap. ſhewath how the true ſquare is found.

SVppoſe a piece of timber to bee moaten, whoſe true ſquare is 7. Inches, this ſquare appointed you to the figure of 7. in the line g. h. vnder whom rightward in the place aſſigned to Timber meaſure is written 2. foot, 11. Inches, $\frac{1}{7}$. As often as that meaſure is found in the length of your timber, ſo many foote of timber is in that piece.

### Another Enſample.

IMagine your Square to bee 22. Inches: ſeeke in the line a. c. Note then how much of your Ruler is left from that to the end of your Rule c: and ſo much belongeth to a Foote. Therefore lay out the meaſure vpon your timber, and reckon how many times yee may finde it, from the one to the other of your Logge: for ſo many foot of timber is there. Euen thus of boord. Seeke the breath vpon your Ruler, in the roome or place of boord meaſure, and immediately before your eyes there remaineth what is to be laid out to make a iuſt foot of boord.

## The vſe of the principall lines in the Geometricall Quadrant on the backſide of the Ruler, and firſt of the leuell line.

*The xv. Chapter.*

IT behoueth you to looke through your ſights q. r. placed in the thickeneſſe of line k. m. a fine thred and plummet falling at liberty out of the Center r. If this plummet and thred chaunce preciſely on the line of leuell (which is r. o. whatſoeuer ye ſee through the ſights, is leuell with your eye, if otherwiſe

wiſe the thing that yee looke vnto is not leuell, either moꝛe oꝛ leſſe then the height oꝛ leuell of your eye: Moꝛe, if the Plummet fall to you ward: leſſe, if contrary.

## How by the line of Leuell to forſee whether the water of any Spring or head is poſſible to bee brought to a place appointed, and alſo to iudge the wholeſomneſſe of it.

*The xvi. Chapter.*

YE ſhall goe to the head oꝛ Spꝛing, and ſet your Ruler to your eye (being in height equall with the water) ſo that the fine coꝛd and Plummet fall pꝛeciſely in the line of leuell. Now if thꝛough the ſights ye may ſee aboue the place, know and iudge the water poſſible to be bꝛought: if your ſight fall vnder, impoſſible. It commeth commonly to paſſe, when the place to the which yee would haue water conueyed, is of any great diſtance from the head, then Hilles, Valleyes, and ſuch like impediments, let the line viſuall to haue his free courſe: whereꝛoꝛe this remedie is pꝛouided. At the head of the ſpꝛing, ye ſhall looke thoꝛow the ſights (as beꝛoꝛe) and note a marke in the next Hill toward the place, then goe to the marke in like manner obſerue another in ſome hill: ſo foꝛth vntill by any of them yee may perceiue the place deſired. If then your ſight running thꝛough the pinnes of your Ruler (the thꝛed euer falling on the Line n.o.) excéede that place, the conueying of your water is poſſible. Otherwiſe not.

Now by the way bꝛiefly yee ſhall bee inſtructed how yee may know the wholſomneſſe of water.

## How good water is knowne.

TAke a cleane pot, and put water in it: ſo ſet it on the fire: after a little boyling, powꝛe it out, if then no filth re-

maine in the bottome of the pot, it may bee iudged the wholeſomer. Or thus. Let fall drops vpon metall, or rather on Glaſſe (any of them being poliſhed) and ſuffer that to drie by it ſelfe: if after there remaine no ſpot or ſigne, it is a good token. Moreouer, if your water bee ſweete, pure, cleare, light, or of little weight, it followeth the water to bee wholeſome for the vſe of man.

## Of the Line of height.

WHenſoeuer the Thred and Plummet doe chaunce iuſtly on the Height, which is n. p. the Altitude or Height that yee ſee is euen with the diſtance from the middle of your Foote, to the nether part directly vnder the toppe, equall with your ſtanding, adding the Height of your Eye downeward. Know that yee muſt euer ſtand vpright with Bodie and Necke, your Feete iuſt together, the one Eye cloſed, &c.

## The line of vpright Altitudes.

IVdge alſo any thing plumbe vpright when the thickneſſe of your Ruler i. l. is cloſely thereon, the plummet then at Liberty falling on q. n. named the Line of heights vpright. Now followeth the vſe of the Scale.

## To ſearch out Heights by the Scale with the aide of two places.

*The xviij. Chapter.*

LEt the Thred and Plummet fall in the one, on the 12. points: in the other Station, on the 6. of the right ſhaddow: double the diſtance betweene the two places, the ſummitie appeareth from that part of the thing meaſured, which is equall in Height with your eye.

eye. Or the one in the 12. the other in 8. of right shadow: then triple the distance. The one in 12. the other in 6. of right Quadruplate, the space. The one in the 12. the other in 6. of the contrary shadow, then the space betweene both the Stations is equall with that yee measure, euer vnderstanding from your eye vpward. Euen that same commeth to passe, if in the one the Thred bee found vpon the 6. of the contrarie, in the other on the 4. of the same, or the 4. and 3. of the contrarie. In all these the spaces are equall with the Altitudes. So then in measuring the distance betweene the two places, yee haue the height from your eye vpward, putting to it the length from your sight downeward, the whole Altitude appeareth: the Base being equall with your standing.

I would not haue you ignorant here how to know lengths which be in height not easie to come vnto. For (as before) get the height of the toppe, the Altitude of the Base or longest part of your length. Subduct the lesse height out of the more, of force your desired length remaineth. Or thus: Let the plummet and thred fall in the 12. Marke your place: goe in toward the thing (the thred as it was) vntill yee see the Base of that length: the distance betweene the two standings, is vndoubtedly the Length.

How lengths in height are knowne.

## How with Scale direct or vpright heights by their shadowes are declared.

*The xix. Chapter.*

TVrne your left eye vnto the Sunne, suffering his Beames to pearce both your sights q. r. placed (as afore is said) in the thickenesse or line k. m. The Thred or Plummet then hanging at libertie, out of the Center n. sheweth as well the Degrees

of height to bee counted from o. as the parts of the Scale cut. If your thred bee found in the 12. part or line of leuell, shadowes of all things being perpendicular eleuated, are equall with their bodies. If the plummet with the thred bee perceiued, cutting the parts next to the sights, which I name points of the right shadow, then euery thing direct is more then his shadow, by that proportion which 12. exceedeth the parts, where the thred was found. If it fall in 1. that is the first part of the right shadow, take the shadow twelue times, to make the height. In two, that is the second part, sixe times, in the third, foure times: in the fourth, three times: in the fift, twice: and $\frac{1}{2}$. of the shadow, in the sixt, twice, in the seuenth once, and $\frac{1}{2}$. in the eight once, and $\frac{1}{3}$: in the ninth once, and $\frac{1}{3}$: in the tenth once, and $\frac{1}{3}$: in the eleuenth ye shall take the shadow once, and $\frac{1}{11}$. part of it.

Right shadow. If the Art of numbring were had, I would will you to multiply the length of the shadow by 12. and the product diuide by the parts, in the which ye found the thred.

Contrary shadow. But if it bee in the parts of the contrary shadow, augment the length of the shadow with the parts declared by the plummet: and the increase diuide them by 12. so commeth the Altitude also.

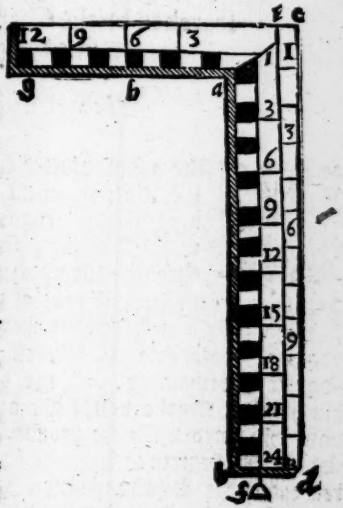
Thus the composition and whole appliance of the Carpenters Ruler is shewed: therefore somewhat shall be now said of the Squire.

I am not ignorant that the common vse of him, is better knowne than I can with many words expresse, wherefore I leaue to write in that behalfe. Notwithstanding I will declare how Heights and Lengths are taken, &c. matters rare and knowne of few Artificers.

Also by Tables to get a true knowledge of the day houre, and that diuerse wayes, with the helpe of the Squire, as is opened in my generall Prognostication, augmented in the yeere of our Lord 1556.

## What length the sides of thy Squire ought to bee, and the diuision of him.

*The xx. Chapter.*




I Meeue not to put foorth the exact making of this Instrument so well knowne. Lo therefore the figure. One side supposed two foote from the inward Angle: and the other a iust foote from the same. The longer a. b. inwardly diuided from the Angle a. vnto b. into 24. equall principall parts, and euery of them into a lesse (if ye list) each containing 10. minutes, also the side c. d. in the outward contrary, plaine from the top c. vnto d. is diuided into 12. euen portions: and againe (if yee require exactnesse) euery of them into 6. each of value 10. minutes: Behold a line and plummet falling from e. to f. a Parallell to c. d. and a. b. Thus this squire is well framed for the vse of diuers Tables put forth in my generall Prognostication, and also for the finding of Altitudes and Longitudes, which here I purpose now briefly to open.

## How by the Squire heights are knowne.

Altitudes or heights are found, the line or plummet centred in the sixt point, cutting h. the middle of a. g. The

moueable sights placed in a. g. or a paralell from that line not vnlike, as is opened of the line of height, in the backe of my Ruler.

## How Lengths in plaine Ground are searched by the Carpenters or Masons Squire.

### *The xxi. Chapter.*

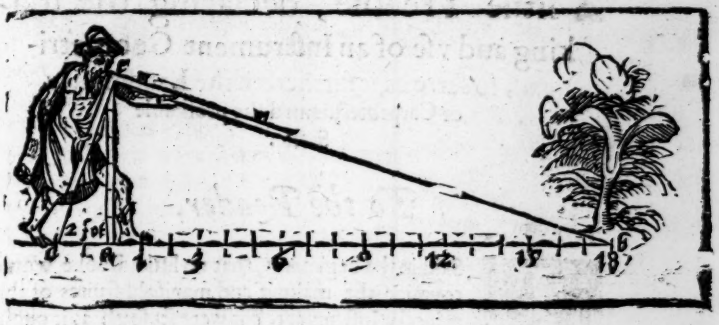
TAke a staffe diuided into certaine portions as yee list, in a 100. or a 1000. parts. At the beginning of your length, vpon the very toppe directly standing, set the inward Angle of the Squire: lift vp or put downe this instrument, vntill you see the furthest part of your Longitude, I meane vntill your sight running from that Angle, to the end of your Squire, come vnto the furthest part of that length. The Squire so remaining, and the Staffe not remooued from his height. Marke where the other end of the Squire next vnto you noted vpon the ground. See what proportion the Staffe then beareth to the part of the ground, which the neerest end of the Squire pointed vnto from the Staffe: the same shall the Length haue to the quantitie of the same Staffe.

### Ensample.

The cause is taken out of Euclid. 33. pro. 1. Booke and the 4. pro. 6. booke.

THe Staffe a.c. in this figure is imagined 6. Foot, and the space a.d.2. Foot. Considering now that 6. the length of the Staffe containeth 2. thrice, therefore the Longitude desired, a. b. of force must containe three times the Staffe (which Staffe is 6. Foote) that maketh 18. Foote. As this is proued true by a small ground in the figure following: so the Art faileth not in a greater space, which the good Speculator

Speculator and diligent Practiſer by any way cannot denie. Yet experience willeth me this to confeſſe, that the Squire is not conuenient for any long diſtance, but the Inſtrument Geometricall (whoſe making and vſe yee may perceiue in the Treatiſe following) vnleſſe yee aſcend ſome Tree or Turret for your ayde, which length knowne, ſhall ſtand in ſtead of your Staffe.




## A Note.

IT behoueth you to haue a fine cord, made faſt in the vpper part of your Staffe. c. which ſhall bee tyed euen with the inward edge of the Squire, and ſo drawne to the ground, where the neere end of the Squire from the Staffe pointed. as ye ſee, d.c. the other end then truly directing to the furtheſt diſtance.

Know that the ground muſt be very plaine and leuell, otherwiſe error enſueth.

Thus the vſe of the Squire is heere ſomewhat declared, but more in my generall Prognoſtication, yea moſt plentifully hereafter (God ſparing life) in a Booke titled, The rare vſe of the Squire in practiſes Mathematicall. In the which Booke profitable pleaſant experiences ſhall bee plainely opened (onely of me practiſed) as well of Perſpectiue, as of the Mathematicals in generall.

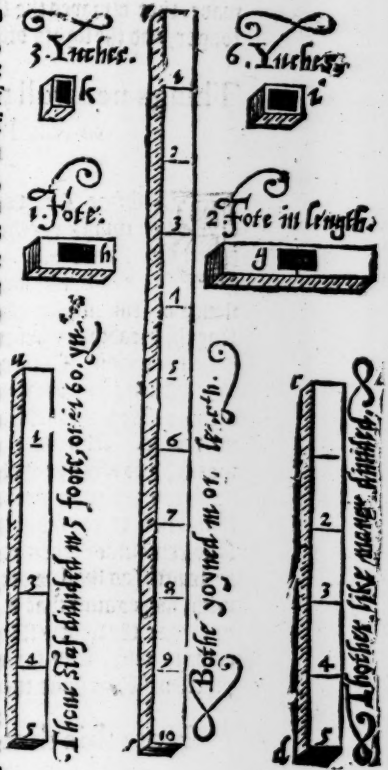
# A little Treatiſe, declaring the making and vſe of an Inſtrument Geometricall, ſo farre as it furthereth the Landmeater or Carpenter, named the profitable Staffe.

## *To the Reader.*

I Said in the beginning, that no little Booke would containe the making and manifold fruites of this princely Inſtrument, if it were ſet forth as it ought to bee in his perfection. Certes the trueth euen here maketh me confeſſe the ſame: yea that there is no Inſtrument ſo generall and profitably pleaſant: Notwithſtanding know (gentle Reader) that the occaſion of his chiefe vſe and profit is not heere miniſtred: neither, to ſay the trueth, doth it appertaine to, or agree with the capacitie of ſuch Artificers. Therefore I ſhall leaue to intreate of his ample large vſe and beſt making, and will ſet him forth in few words: yea ſufficiently for the Land-meaters capacitie or Carpenters purpoſe, that at the leaſt, they may receiue ſome kinde of fruite with the Geometrer. And in time to come (by other meanes) as I ſee cauſe, I will largely declare, and there decke him with his proper beauties. Here now followeth the making, and ſo briefly, how he is applied for the profit of the aforenamed Artificers.

## The making of this profitable Rodde or Staffe.

WE ſhall prepare two ſmall, ſtreight, ſtiffe, round, or rather ſquare rods of mettall or of wood, well plained of like bigneſſe and length. Although it make no matter of what length, yet to auoide the errours, which little inſtruments, and ſhort ſtaues bring, and alſo to beare with the rude vnwonted handling of ſuch Artificers: let our Rods bee each fiue, or at the leaſt three foote, and euery foote diuided in 12. euen parts or Inches, as yee ſee a. b. and c. d. Theſe Rods muſt bee forged with a boyce in the end of them to ioyne readily tenne or ſixe foote in length, (when time requireth) as the figure e. f. ſheweth. Alſo yee muſt get (by the helpe of ſome Craftſman) foure other like Rods, the longer g. 2. Foote: the next h. 1. Foote: the other i. 6. Inches, then k. 3. Inches, the laſt and ſhorteſt l. 1. Inch, and ½. Each of theſe muſt haue in their middeſt a hole, that the long ſtaffe of ten foote may bee put through them, and they moued on him at pleaſure by and downe, alwayes cutting the longer ſtaffe e. f. Squirewiſe, and made to tarry on any diuiſion, as



as occasion shall be giuen: which all are easily to bee perceiued by the figure following, although my rude declaration hath not expressed my meaning.

Here note in the stead of your short staues, yee may haue one crosse staffe two foote long, with currant sights, so artificially made, that alwayes the short staffe shall runne squire vpon the longer, and the sights distant, as ye list to place them.

## Things needfull to be knowne before the vse of this Instrument is opened.

*The ij. Chapter.*

BEfore I intreate of this vse, it behoueth to know things necessary, and first which of the fiue little staues g.h.i.k.l. mentioned in the making is to bee put vpon your long staffe e.f. according to the distance of the marke. Note if your marke be neere hand, be it length, breadth, or height, the longer g. doth seeme meetest to haue the roome, if more of length, the other h. and so the further distance, the shorter the staffe requireth to be, which shall occupie that place. Oft practise sheweth this better than many words. Also note, if chance bee to goe in toward your marke, (as after ye shall see how) you must remoue the short staffe inward more neere to the end of the longer e. If ye bee compelled to goe from it, then put it from e. toward the end f. Also remember when ye are appointed to measure any breadth or length (as shall be declared) it behoueth you to stand right with, and against that breadth: yea, and the longer the breadth or larger the wideneſſe or length is, the better the thing will come to passe. And for heights it is necessary (if yee regard all preciſeneſſe) to haue the height stand directly vp.

## Note this that followeth to be generall in all workings.

YE must stand right vp with your Bodie and Necke, your feete iust together, your hands not much moouing, the one eye

eye closed, and euer marke your standing right with the midst of your feete. Bee not ignorant here, that I call the extremes of the little staues, the very ends where the sight euer runneth. And no difference betweene the Altitude and height, betweene the Longitude and length: the Latitude and breadth. The short staues I name by the letter figured ouer them. Your eye must euer bee placed in the end of the longer staffe c. and with the other eye ye ought to winke.

What these words meane, Longitude, Latitude, Altitude.

These trifles and such like omitted, letteth the trueth to come to passe, and make men to suspect the Ground, which is most certaine.

## How heights, standing directly vp, are measured by the instrument.

*The iij. Chapter.*

PVt the staffe g. vpon the longer c.f. and moue him his iust length from the beginning of the longer c. turne the ends of g. toward you, and according to that height placing your eye (as is said) euer at the beginning of the longer c. with the other eye winke. Then go backe vntill ye may plainly perceiue the very vpper part of that Altitude, and also the lower end by the extremes of your shorter staffe g. Now the space of the middle of your foote to the base of the height is equall with the Altitude.

### Or thus.

When ye shall see any Altitude, whose measure yee require, imagine by coniecture how oftentimes that height is found in the space from it vnto your standing. Then moue your shorter staffe (chosen as aboue most conuenient) euen as often his owne length from the beginning of the longer c.

where your eye is euer placed. This done, turne the ends of your little ſtaffe, your eye being in c. according to the height: looke whether yee may ſee by the extremes of your ſhorter the very top, and alſo the loweſt part of the height. If not, moue the ſhorter a length further toward f, or neere to c. as yee ſee cauſe, and as your coniecture failed. Or let your little ſtaffe remaine, as by coniecture hee was put, and goe toward or from that height, vntill the Altitude agree iuſtly with the extremes of your ſhort ſtaffe. Then marke that place with the middeſt of your foote.

Now ye may conclude, that the height is as often contained in the diſtance, which is betweene the marke and it, as the length of that little ſtaffe is found remooued from the end of the longer, &c.

## Enſample.

How the iuſt height is knowne.

If the ſhort ſtaffe bee tenne times his owne length from c. affirme the height contained in that diſtance ten times only.

The Altitude is thus gotten. Mooue your ſhort ſtaffe from his late being a length either toward or from c. as yee liſt to goe in or backe. Then goe fro or neere vnto it (as before) vntill the very ſummitie, and alſo the loweſt part of the height agree with the extremes of your ſhorter ſtaffe. The ſpace then betweene your marked place and this latter, declareth the iuſt height. Oftentimes through impediments, yee ſhall not haue roome to goe ſo farre backe or forward, as the height commeth vnto. This remedie is prouided. Mooue the little ſtaffe halfe his length, and ſo ſeeke two ſtations (as before) vntill the extreme of the ſhorter ſtaffe bee found iuſtly to anſwere either end of the height. Then the ſpace betweene the two ſtandings muſt bee doubled to haue the iuſt height: or if yee liſt, yee may moue the ſhorter, according to the fourth part of his length, or to any portion, as to the fift, firt, twenty, &c. then ſhall yee haue that part of the height betweene the two ſtations.

A remedy prouided for want of ground.

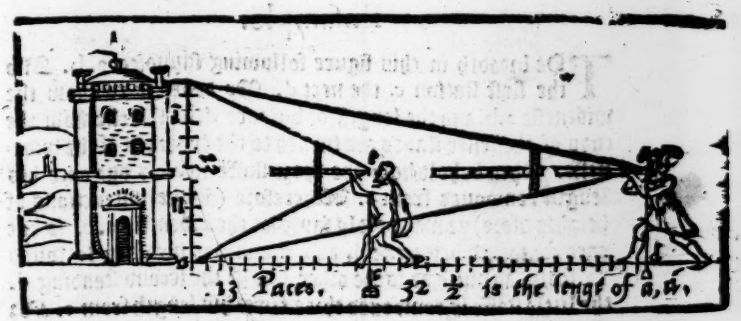
Yet

Yet know this (which experience by diligent practise will shew) the bigger parts yee take the lesse errour ye commit. A little error often multiplied, encreaseth to a great.

Now that all the aforespoken may the better bee perceiued, behold the example ensuing, as yee may see by figure declared, in the which the height is imagined a.b. the first station c. the short staffe g. is moued from c. till his length. I am forced to conclude, that the Base of the height a.b. is from my standing c. euen his precise length. So then if you measure that distance of a.c. being 13. paces, yee haue the true height of a.b. as many. In the other standing place d. the shortest staffe is found from c. twice his length and a halfe, wherefore I must affirme the height a.b. to be contained or found in the distance a.d. twice and a halfe: which length a.d. is apparent 32. paces. All this that is spoken of the height, may well bee vnderstood of Latitudes or widenesses, and lengths following.

The ground of this may be gathered of Euclide in his perspectiue, 21. Theo.

In Altitudes this rule is not perfect, except the eye be leuell with the middle of the Altitude.



## How the breadth or wideneſſe of things are found, and by them, Length or any distance at pleaſure.

*The iiij. Chapter.*

WHatſoeuer I haue inſtructed afore of heights, the ſame vnderſtand here of wideneſſe, lengths, &c. For none otherwiſe are Latitudes or wideneſſes ſearched by this Inſtrument, then before is declared of heights, onely this excepted, that the ſhort ſtaffe muſt lie contrary, the ends according to the breadth, ſeeing by the extremes of the ſhort ſtaffe, the very vttermoſt parts or ends of the Latitude, noting your ſtations right with the midſt of your foote. And ſo performe all as afore. And as I ſaid, thereof the parts of the height found betweene your ſtandings, euen the ſame things is well vſed here, for all manner parts of the breadth.

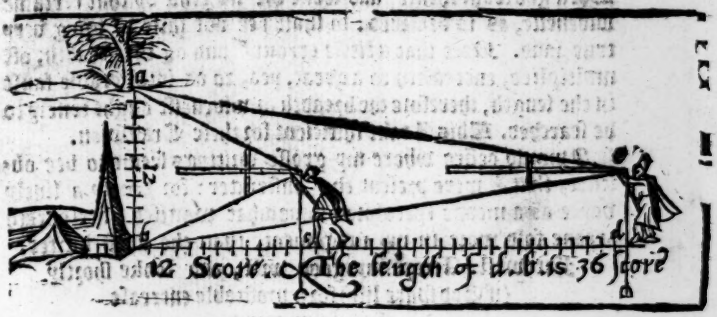
### Enſample.

THe breadth in this figure following ſuppoſed a. b. Alſo the firſt ſtation c. the next d. My deſire is to know the wideneſſe a. b. and the length or diſtance d. b. Marke how the ends of the leſſer ſtaues are turned to the extremes of the wideneſſe. Then behold how the ſhort ſtaffe in c. is but once his length remooued from c. Wherefore (by the inſtructions of heights afore) ye may boldly ſay, that the wideneſſe a. b. is but once contained betweene d. and b. and that meaſure is found 12. ſcore, as much as is the other a. b. In the ſecond ſtanding d. the little ſtaffe is remooued three times his length from c. For that cauſe I conclude (and truely) from b. to that ſtation three times the breadth, which breadth is 12. ſcore. So by the wideneſſe I haue found the length of b. d. 36. ſcore, my deſire. Thus are Latitudes found, and by them lengths, &c.

Behold

Behold the figure.

Ye muſt alwayes ſtand directly againſt the middle of the Breadth.




Whenſoeuer any diſtance is put, whoſe certaine length yee require: meaſure (by the Art expreſſed) either the height of any thing there found, or the breadth, and ſee how oftentimes that wideneſſe or length is contained vnto your ſtanding: which knowne, the length cannot be hid, as is declared.

NOw in few words to conclude, yee may by this Inſtrument meaſure the diſtance of Houſes, Steeples, Trees, the length of Walles, the breadth of Ditches, Images in height, and ſuch like. The good wittie Carpenter ſtanding in a place, where hee may plainely ſee a whole houſe, or any manner frame with great pleaſure, may by this get ſpeedily the true proportion of that houſe, which hee ought to note in a Table, and when time commeth (not without his great praiſe) may make, reare and ſet vp the like. This I take to be ſufficient for theſe Craftſmen.

A more larger vſe of this Inſtrument.

I haue

How the length of land is exactly found.

I haue before forgotten to admonish you whensoeuer yee list to measure any land exactly, by the Instrument Geometricall, named the profitable Staffe, to set vpright a Rodde, the length of a Pearch. Or if the distance be long, to passe out, or rather iustly mete fiue or moe Pearches, at the end or head of your length, the extremes noted with two visible markes. Then goe from thence, and seeke the lengths by that certaine widenesse, as is declared: so shall yee not faile to bring very true land. Note that a little errour found on the breadth, oft multiplied, encreaseth to a great, yea, to an intollerable fault in the length, therefore the breadth or widenesse ought truely to be searched. This I take sufficient for these Craftsmen.

I would desire where my grosse writings seeme to bee obscure, that I were present the Instructer: for truely a liuely voyce of a meane speculator somewhat practised, furthereth tenne fold more in my iudgement, than the finest writer.

Farewell. Accept my good will, and looke shortly (if God spare life) for a profitable encrease of these matters.

FINIS.